..THE IRON AGE..

JANUARY 5, 1933

ESTABLISHED 1855

Vol. 131, No. 1

This Must Be Done

1933

OUR industry, now entering this year of 1933, faces a large task and a great responsibility.

Neither producers nor consumers can survive an indefinite prolongation of the dissipation of values such as has accompanied the abnormally low demands of the past six months.

What can be done about it?

The problem cannot be solved by any one industry. Nor can it be solved by an intensification or continuance of competition for the meager business that is available. There are too many pursuing too little.

The little must be made larger.

It can only be made larger, in our own industry or in any other, by the gradual restoration of public confidence.

Fear, today, has many spokesmen; confidence has few.

Business, during the past six months, has actually been trying hard to improve and has succeeded, here and there, in spite of the lack of intelligent, organized help.

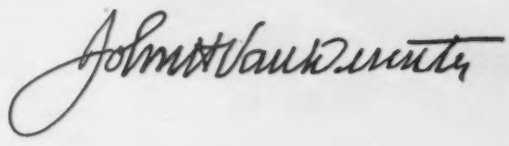
Hope has been shaken and bewildered by a long campaign of bitter political recrimination. It is dazed by the dire predictions of disaster of the "intellectuals" now volunteering as pall bearers for the burial of capitalism.

The destructive forces are well organized; the constructive forces work alone.

It is time for these constructive forces to present a united front. It is time for all industries and all businesses to join shoulder to shoulder with the natural forces of recovery against the retarding influences of the destructionists and the defeatists.

The public demands to be shown the way out. Shall this be done by the topographers of business who have blazed the known trail, or shall we be led by jackasses and jack-o-lanterns into dangerous, unexplored economic jungles?

Our industry must bear its share of the responsibility for answering these questions in 1933.



1932 Establishes New Low Records in

Output of steel ingots and castings declined to 13,500,000 tons, or about 19.5 per cent of capacity, smallest since 1902.

* * *

Pig iron and ferromanganese production about 8,750,000 tons, lowest since 1896.

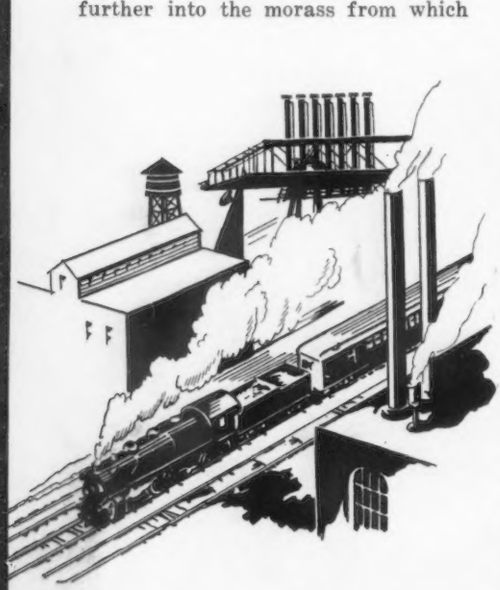
* * *

Finished steel prices decline; pig iron quotations at 1915 level; scrap prices lowest for all time.

NO parade of statistics is needed to emphasize that 1932 was the most disastrous year in the history of the American iron and steel industry. For many years, perhaps for a generation, eyes will be turned back to the past year as representing the extreme depths to which business depression can go. We described 1931 as a "calamitous" year; what, then, shall be said of 1932?

Just as 1929 was unique in establishing new high marks in almost every phase of the iron and steel industry and in all branches of industry and transportation that are supported by or give support to iron and steel activity, 1932 has achieved the distinction of imprinting on the record a series of statistics so distressingly negative that they may stand as a "low" for many years, or even decades to come.

While 1933 has arrived with few tangible signs of a better era immediately at hand, it is almost inconceivable that the new year will be worse than the one we have just passed through, considering that some of our economic problems which have borne down heavily upon industry are on the way toward amelioration if not to early solution. In view of the uncertainties which still beset the path to recovery, prophecies are still as hazardous as they were a year ago, when it was thought that 1932 might be a year of recuperation. Instead, the financial and political troubles of a debt-laden world, with the inevitable repercussions on business at home and abroad, drew us further into the morass from which we have scarcely begun to extricate ourselves.



In four years, from 1929 to 1932, we have run the gamut from prosperity to impoverishment, from virtually full employment for all workers to millions of unemployed, from generous profits for nearly all forms of productive effort to staggering losses. Statistically, the comparisons between 1932 and 1929 are almost fantastic.

Steel Ingot Output Smallest Since 1902

Steel ingot production, including electric and crucible and castings, declined to about 13,500,000 gross tons in 1932 from 56,433,473 tons in 1929, a drop of more than 76 per cent. It was the smallest output for any year since 1902, when 14,947,250 tons of ingots and castings was produced, and final figures may show that it went below the 1901 total of 13,473,595 tons. Relating production to capacity, 1932 was about a 19.5 per cent year in steel, whereas 1931 was a 37 per cent year, 1930 output was 60 per cent of capacity and that of the banner year 1929 was 87.5 per cent. At the end of 1931 comparisons were made with the depression year 1921, but the decline of 1932 leaves the 1921 output of 19,783,797 tons of ingots and castings, which was 37 per cent of the then-existing capacity, as a mark of mild prosperity when placed alongside the 1932 record.

In pig iron as well as in steel, the 1932 total presents a dismal picture of the extreme contraction in industrial activity. Production of coke pig iron and ferromanganese was about 8,750,000 tons, the smallest for any year since 1896, and barely half of the 18,380,141 tons of 1931 and about 20 per cent of the all-time peak of 1929.

Lake Superior ore movement, at 3,567,985 tons, was the smallest since 1886, scrap prices dropped to a new low level for all time, pig iron prices went back to the average of early 1915, quotations on some steel products approached pre-war prices, and in fact, if some of the extreme concessions from open market quotations are taken into account, some forms of finished steel touched or even went below those of 1913.

Steel Companies Suffered Heavy Financial Losses

Under these circumstances, the continued heavy financial losses from which only one or two companies escaped will leave that portion of the steel industry which publicly reports its affairs with an aggregate deficit of more than $200,000,000 for 1932. This has occurred despite widespread efforts toward economy, including reductions in salaries and wages. Through it all the steel industry has endeavored to give at least part-time employment to all, or nearly all, of its workers, and has added to its corporate losses because of the inefficiency entailed in such staggering of work.

Steel has presented a worse picture than some of the industries upon which it normally depends for the bulk of its business. Railroad freight traffic, for example, was down less than 50 per cent below its peak movement of 1929 and about 25 per cent below that of 1931, yet steel production fell more than 76 per cent from 1929 and almost 48 per cent from 1931. Railroad buying, however, was the lightest in several decades, as is illustrated by the fact that domestic roads ordered only 1734 freight cars and seven locomotives during the year, while even in the poor year 1931 the railroads bought 10,880 freight cars and 219 locomotives, and that record was by far the lowest in 15 years or more. Automobile production in 1932 declined nearly 75 per cent from 1929 and about 42 per cent from 1931. Building construction, on the basis of dollar volume, suffered a serious shrinkage in the past year, which had a total of about $1,500,000,000 in contracts against about $4,000,000,000 in 1931, but the figures are not strictly comparable because of declines in costs of materials and labor.

American iron and steel production has suffered a more severe de-

s in All Branches of Production . . .

By C. E. WRIGHT

cline than that of other steel-producing countries. Taking world steel production as a whole, the falling off in steel ingots in 1932 was 28.5 per cent from 1931, whereas in the United States there was a decline of 48 per cent, while world pig iron production dropped about 30 per cent below that of 1931 against a slump in this country of about 53 per cent. It is also of interest that the combined 1932 steel output of the three leading foreign producing countries—United Kingdom, Germany and France—was not much less than half of that of 1929, while the United States output last year was less than one-fourth of that in 1929.

Imported Steel and Pig Iron Disturbs American Markets

International trade in iron and steel has naturally slumped along with domestic business, but the decline in imports was relatively less than that of American exports. Outgoing shipments of iron and steel, at 585,600 gross tons, with December estimated, were the lowest on record, comparing with 984,815 tons in 1931 and 3,063,075 tons in 1929. Even with this small trade, more than a third of it consisted of iron and steel scrap, going principally to Japan and Canada. Imports in 1932, in striking contrast to exports, compared favorably with those of the previous year, being estimated at 380,610 tons against 421,089 tons in 1931 and with the peak movement in recent years of 774,212 tons in 1928.

Pig iron and ferromanganese imports, aggregating 116,386 tons and 22,111 tons respectively, were the heavy tonnages of raw materials brought into the United States. Pig iron came in greatest quantities from the Netherlands. Finished steel came chiefly from central European countries, Belgium leading with a total of 87,742 tons in the first 11 months of 1932.

The Atlantic and Pacific ports were particularly affected by imports of bars and shapes. The New York area was a battleground between foreign and domestic steel, particularly reinforcing bars, throughout the year. Welsh tin plate was brought in on the Pacific Coast at prices much below those quoted by American producers. Even German-made steel pipe, which in previous years had scarcely been a factor in our import trade, found its way into jobbers' warehouses on the Pacific Coast. To aggravate the situation, the Canadian market, which for many years has been the best outlet for steel in our export trade, was virtually closed to American mills by the agreement with Great Britain to establish preferential tariffs intended to build up inter-empire transactions. A conspicuous example of the loss of Canadian trade was the purchase by an American can manufacturer of about 1,000,000 base boxes of Welsh tin plate for its Canadian plants, most of this business having heretofore come to American mills.

With such problems as these, in addition to others that were the natural outgrowth of the depression, the steel companies came closer together in cooperative effort along remedial lines. They found common ground in seeking to curb imports of European steel. Official complaint was lodged at Washington by the American Iron and Steel Institute alleging that foreign steel was being sold in this country in violation of the anti-dumping act, and the contention is still the subject of a broad inquiry by the Bureau of Customs.

New Program Inaugurated by Iron and Steel Institute

Another important cooperative movement was the inauguration of a more comprehensive program of work for the American Iron and Steel Institute, the plan of reorganization including the employment of a paid president and the enlargement of the executive staff. The broadened scope of the institute's work is a recognition that production rather than marketing or merchandising has played too prominent a part in the steel industry.

During the prosperity era the emphasis was not only on production but on increasing steel-making capacity. In the race among steel companies for supremacy there was apparently no thought that the upward trend of steel demands would be seriously halted. A lesson of the depression is that there must be a new appraisal of steel requirements for the years to come.

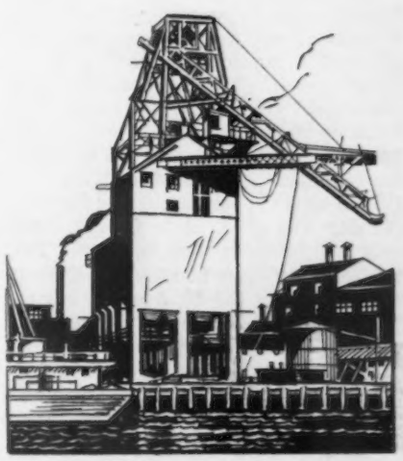
There has not only been a cessation of the building of new capacity, but a tendency toward abandonment of high-cost or obsolete plants. A start in this direction was the recent announcement by the United States Steel Corpn. that it would soon dismantle the Newburgh steel works of the American Steel & Wire Co. at Cleveland, including the blast furnaces. The extravagance of operating high-cost plants in times when costs are a paramount consideration has been borne in upon the steel companies, with the result that a further scrapping of plants in the next year or two will greatly reduce the estimated steel-making capacity of the country.

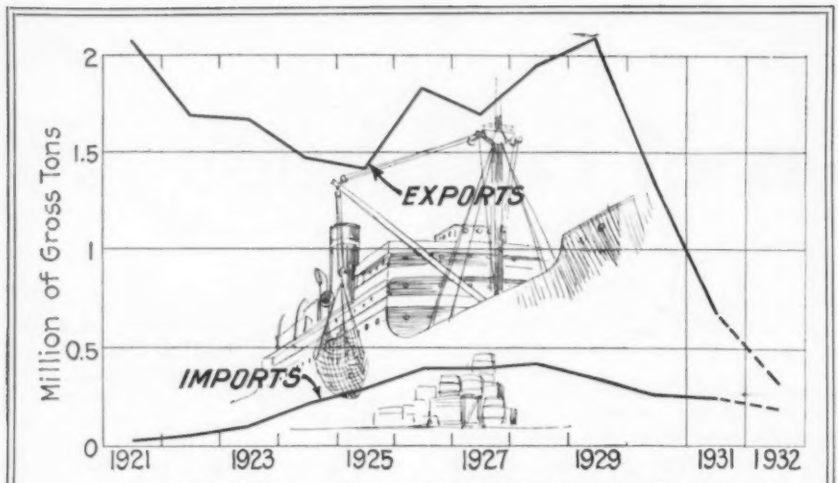
Only 100,000 tons of ingot capacity was added during the past year, all by the Ford Motor Co. No blast furnaces were built. Nor is any new capacity projected for 1933.

Pig Iron Output Drops To Lowest Total Since 1896

PIG IRON production in 1932 dropped to the lowest total for any year since 1896. Last year's output of coke pig iron and ferroalloys was about 8,750,000 tons compared with 18,380,141 tons in 1931 and 42,475,790 tons in 1929, the peak year. The 1932 total surpassed that of 1896 (8,313,000 tons) by only a small margin. It is worthy of comment, however, that in 1895 an output of 9,221,000 tons established a new high record, while last year's production was only about 20 per cent of the all-time peak in 1929.

Output of pig iron rose slightly during the first two months of 1932, but a decline began in March which continued through August, when a low of 17,115 tons daily was reached. This was the lowest daily rate since October, 1896, when 16,079 tons a day was produced. A seasonal increase





Iron and Steel Exports Dropped More Sharply Than Imports.

made itself felt in September, and the number of active furnaces increased from 42, making iron at the rate of 16,225 tons a day on Sept. 1, to 51 furnaces producing at the rate of 20,860 tons on Dec. 1.

The practice of curtailing production as much as possible without banking or blowing out furnaces was continued during 1932 by nearly all producers. It was possible in some cases to reduce output to only about one-third of normal capacity without lowering the grade of iron produced, or seriously injuring the furnace lining. Banking of stacks over a week-end became rather common, and turning off the blast for as long as 18 hr. daily was widely practiced. In the case of merchant stacks, operation on low wind proved most satisfactory in curtailment of output.

Although in recent years the smaller blast furnaces have been gradually disappearing from the list of potentially serviceable stacks, with the result that the average daily output per furnace has been steadily increasing, such increase as had occurred in prior years was not in evidence in 1932. This was no doubt due to slowing down of the blast at frequent intervals.

For example, in 1929, when blast furnace capacity was being pushed to its utmost, the daily rate per furnace attained a maximum of 576 tons on June 1, when 219 furnaces were in operation. On Dec. 1, when only 177 furnaces were operating, the lowest number during that year, the rate per day dropped only to 556 tons. In 1930 the maximum output per furnace per day was 598 tons on Oct. 1, when only 123 furnaces were in blast. The maximum in blast at any time during that year was 185 on April 1, but at that time the daily rate per furnace was 573 tons. The rate per day held above 500 tons during all of 1931 and the first three months of 1932, but beginning in April of last year there was a decline, the low point having been 381 tons a day on Aug. 1, when 46 furnaces were in blast. Although the number of active furnaces had declined to 42 on Sept. 1, the low for the year, the rate per day had risen slightly to 386 tons. By Dec. 1, when 51 furnaces were active, the rate had risen to 409 tons. The number of furnaces in blast at the beginning of each month in 1932, with their operating rate, is shown in the accompanying table.

Number of Blast Furnaces Reduced to 282

According to the records of THE IRON AGE, only seven stacks were abandoned during the year, there having been 282 potentially active units available in the country at the end of 1932. As recently as 1921, the total stood at 422. It is extremely unlikely that more than 200 of the potentially active stacks today will ever operate again, as years of idleness have rendered them useless unless large sums are spent to bring them up to date.

Pig iron markets during the year were characterized by a continuance of the price decline which began in the summer of 1929, and which has finally carried quotations on merchant iron in most of the principal producing districts below the cost of production. THE IRON AGE composite price dropped gradually from $14.81 a ton at the beginning of January to $13.56 a ton at the year-end, the lowest since August, 1915. Thus, the net decline of $1.45 a ton exceeded the $1.11 drop in 1931.

As in the preceding year, competition between adjacent producing districts was very keen, and sellers did not hesitate to make sales of comparatively small tonnages in outside districts at prices well under the levels prevailing in the natural territory which they served. It thus happened that selling levels current in various districts were arbitrarily established by iron brought in from distant points, and local producers were forced to meet the situation or withdraw from the market.

In most districts the average price on the various grades of iron sold dropped approximately $1 a ton, but in eastern Pennsylvania an average decline of about $2.50 a ton was recorded. Elsewhere along the Atlantic seaboard competition of foreign iron forced domestic prices downward.

Pig Iron Imports Heaviest From the Netherlands

Pig iron imports in the 10 months ended with October amounted to 107,610 tons, compared with 74,610 tons in the corresponding 1931 period. Of the 1932 total, the Netherlands shipped more than half, while British India and the United Kingdom followed in the order named. A new competitive factor late in the year was the receipt of a small lot of Japanese pig iron, with more to follow. In view of the fact that consumption in seaboard and nearby foundries last year was considerably less than half the preceding year's total, the percentage increase in foreign iron consumed was larger than the figures on imports indicate.

Foundries bought sparingly during most of the year, though in the late summer and early fall a moderate buying movement for forward delivery occurred. One large consumer bought upward of 50,000 tons, covering requirements well into 1933, but this was an outstanding purchase, and there were few others that exceeded 5000 tons. Truck deliveries of small lots were common in nearly all industrial sections. In the intensification of competition between producing districts, Lake Erie furnaces reached out for business over a wide territory, competing actively with Southern iron in the Cincinnati market and invading the Valley district, which has suffered further diminution of its once pre-eminent position as a merchant iron producing center. At times during the year no merchant furnaces were active in either the Pittsburgh or Valley territories.

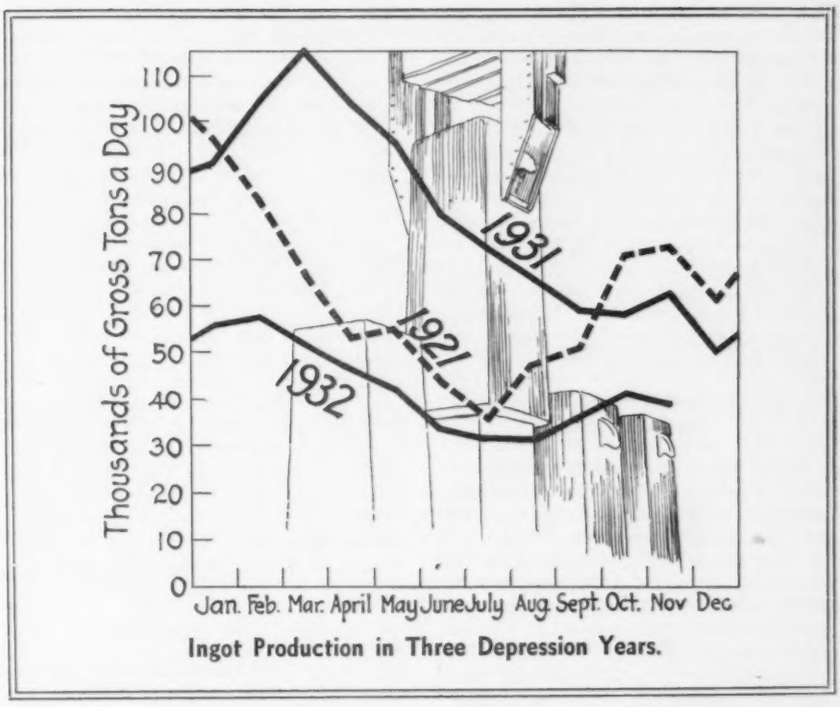
Water shipments were a factor in the Pittsburgh district, particularly in shipments of basic iron. Steel companies, as sellers, dominated the basic iron market in that territory, and the largest transaction of the year in that grade, in which the cheaper cost of water movement was an important element in the delivered price, brought out quotations well under those that had been established as the open market. Four steel companies shared in this business. In the Pittsburgh district a small cost saving was made by iron producers in taking water shipments of limestone from Allegheny River quarries to furnaces on the Ohio and Monongahela rivers.

A factor which has tended to restrict the foundry melt of pig iron even beyond the low limits prescribed by the poor business conditions is the low price of scrap. The spread be-

tween the prices of good grades of cast scrap and pig iron in nearly all industrial centers was so great throughout the year that foundries used more than the usual percentage of scrap, in some instances melting an all-scrap mixture in cupolas. Manufacturers of alloys have shown foundrymen how to produce good castings from scrap by the addition of alloys, and this process of education is likely to have lasting results upon foundry practice, at least until such time as the spread between scrap prices and pig iron prices has narrowed.

Daily Rate of Pig Iron Production in 1932

Month	Furnaces in Blast First Day of Month	Operating Rate Tons per Day on First Day of Month	Daily Average Production During the Month
January ...	56	29,365	31,380
February ..	61	30,630	33,251
March	64	32,880	31,201
April	60	29,135	28,430
May	60	27,730	25,276
June	53	22,965	20,935
July	46	18,955	18,461
August	46	17,525	17,115
September..	42	16,225	19,753
October ...	47	19,205	20,800
November ..	49	20,170	21,042
December ..	51	20,860	.....



Ingot Production in Three Depression Years.

Steel Prices Fluctuated Over Narrow Range

STEEL prices during 1932 on the ordinary run of business fluctuated over a narrow range, reflecting the efforts made by producers to check their heavy losses. However, the open market quotations, though applying on the bulk of the orders, were departed from frequently on attractive tonnages, such weakness having been most apparent at times during the year on sheets, plates and structural shapes.

THE IRON AGE finished steel composite price, covering eight products that make up about 85 per cent of the total steel consumption, ranged from a low of 1,926c. a lb. as of Feb. 2 to a high of 1.977c. as of Oct. 4, a difference of only $1.02 a net ton. The 1932 average was only $1.16 below that of 1931. The 1932 low was 82c. a net ton below the minimum of the 1921-1922 depression period, namely, 1.967c. a lb. recore in the first week of March, 1922, and was $7.82 below the peak of 1929, $68.16 below the war-time peak of 1917, and $46.22 a ton below the post-war peak of 1920.

The eight items included in THE IRON AGE composite price are bars, shapes, plates, heavy rails, standard pipe, plain wire, No. 24 gage hot-rolled annealed sheets and hot-rolled strip. Bars, shapes and plates were quoted during the first quarter of the year at 1.50c. a lb., Pittsburgh, but an advance of $2 a ton to 1.60c. occurred at the beginning of the second quarter, and carried through the remainder of the year. Heavy rails were reduced from $43 to $40 a ton in late October, the first change in 10 years. A simplification of the discount system on standard pipe was put into effect at the beginning of September, by which single discounts were substituted for multiple discounts, but the net prices were only slightly altered. Plain wire carried through the year at 2.20c. a lb., Pittsburgh, sheets had a number of fluctuations, and during the early part of the year were the weakest items on the list, a situation that forced a stabilization movement at mid-year. Hot-rolled strip stood at 1.40c. during nearly all of the first half, but was advanced to 1.45c. at the beginning of the second half.

Sharp Price Cuts on Tin Plate

One of the sharpest price cuts was on tin plate, which was reduced $10 a ton, or from $4.75 to $4.25 a base box, Pittsburgh, in late November, bringing it down to the lowest figure since 1916. The adoption of a lower "official" tin plate price was accompanied by a determination among producers to scale down the concessions allowed to large buyers.

Various efforts were made throughout the year by steel companies to differentiate between small-lot and large-lot buyers. Makers of cold-finished steel bars and merchant wire products were successful in introducing a system of quantity differentials, but such attempts by makers of other products got nowhere, largely because of the fact that many consumers who would normally be classed as large buyers dropped into the small-buyer class through force of circumstances.

Two innovations in quoting steel prices, other than quantity differentials, were introduced during the year. One was a zone delivered price on bars for the automobile manufacturing district wherein the delivered price at Detroit became $4 a ton above the Pitsburgh base and for eastern Michigan points outside of Detroit $5 a ton above Pittsburgh. This move was made to overcome variations in delivered prices due to use of both rail and water transportation. Makers of structural shapes adopted a plan of quoting delivered prices at the job, including fabrication-in-transit rates where such apply.

Sheet manufacturers decided to drop the designations "automobile body sheets" and "steel furniture sheets" and to sell these grades on the cold-rolled sheet base, applying the standard extras for finish.

Scrap Prices at an All-Time Low Level

CONSUMPTION of scrap by the iron and steel industry naturally declined drastically during the year. As in the previous year, steel companies were not always able to take advantage of the economies offered by cheap scrap, because of the necessity for consuming pig iron which they could not avoid making. Nevertheless, foundries in many cases increased their melt of No. 1 cast scrap, as the spread between scrap and pig iron prices widened but foundry consumption was such a small part of total scrap consumed that this tendency did not affect the total melt of old material very markedly.

Scrap prices reached a new low in July after having declined steadily through the first six months. The IRON AGE composite price of No. 1 heavy melting steel, being an average for this grade at Pittsburgh, Chicago and eastern Pennsylvania, had declined to $8.50 at the close of 1931, and at no time in 1932 did it exceed

this level. Early in July a minimum of $6.42 a ton was reached, and the average for the entire month was only $6.46. Although the composite figure failed to reflect the early spring advance in steel ingot production, the seasonal rise in output in September and October was forecast by an advance of more than $1 a ton in scrap. Late in September the figure stood at $7.75, as compared with the high for the year of $8.50, established early in January. Since September another decline has occurred, but it seems unlikely that the composite price will again fall to the July low.

Chicago Market Suffers Sharpest Price Declines

Price fluctuations during the year were most pronounced in the Chicago district. No. 1 heavy melting steel at Chicago declined from $7.75 a ton in January to $4.75 early in July. By September half of this loss was regained, but the price was again approaching the year's low at the end of December. In the Pittsburgh territory the No. 1 heavy melting steel price fluctuated only $2.25 a ton from a high of $10.25 in the first three months of the year to a low of $8 in the first week of August. The price rose to $9.75 in September, but also suffered a year-end reduction.

Considering the low prices at which scrap has been sold in the past year, stock in the hands of consumers are perhaps not as large as might be expected. A few steel companies have laid in fairly good-sized stocks, but the majority have preferred to keep their raw material inventories low, regardless of the ultimate savings that might be effected. Dealers' stocks have not grown as rapidly as they might have if bank accommodation had been easier to obtain. Producers of scrap, including the railroads, have in many instances withheld supplies of scrap from the market because of the low prices. In numerous instances railroads withdrew stocks of scrap from sale after receiving bids which were not satisfactory.

Scrap Stocks Probably at Least 2,000,000 Tons

Despite small consumption and the unwillingness of some producers to dispose of their supplies, scrap stocks probably are no larger now than they were a year ago. Some scrap dealers believe they are smaller owing to the fact that production of scrap in the past year has been reduced because of restricted manufacturing in virtually all metal-working industries. Obviously, it would be impossible to obtain a complete estimate of all scrap stocks in the country, as many small lots are scattered among the thousands of plants that use steel. However, THE IRON AGE has made a survey of the principal stocks in leading centers in the hands of steel companies, scrap yards, railroads and the automobile companies, and finds that the total of such accumulations is approximately 2,000,000 tons, exclusive of about 500,000 tons in ships that will be scrapped at Philadelphia and Baltimore. As most of this boat scrap will not appear on the market for some time to come, it can be eliminated as a definite factor in the scrap market of the near future.

Pittsburgh Scrap Stocks

In the Pittsburgh district, including Wheeling, steel mill stocks are estimated at 150,000 to 175,000 tons, while Youngstown companies have about 50,000 tons additional. Dealers' stocks at Pittsburgh are estimated at 150,000 tons, while less than 25,000 tons is held in yards at Youngstown and vicinity. Stocks in railroad yards at Pittsburgh amount to about 40,000 tons, with an insignificant tonnage in store at Youngstown.

Steel companies at Chicago and vicinity have about 300,000 tons of scrap on hand, railroads which dispose of their scrap at Chicago have about 150,000 tons, and the amount of scrap stored in dealers' yards in that territory is estimated at 80,000 tons.

In the Eastern district, including eastern Pennsylvania, Baltimore and Buffalo, steel mill stocks probably aggregate about 450,000 tons, yard stocks about 150,000 tons, while railroad stocks are probably at least 200,000 tons, though all of this is available for distribution to steel plants at any point between the Atlantic seaboard and Chicago.

At Detroit the two steel plants have about 70,000 tons. Stocks in the hands of automobile companies, exclusive of Ford, which uses its own scrap, are probably not more than 15,000 tons, as most of the automobile plants sell their scrap at least once a month.

Stocks at Cleveland are not large, probably not in excess of 75,000 tons, including yards of steel companies and dealers. In all of New England, it is estimated, there is not more than 100,000 tons. No account has been taken of scrap on the Pacific Coast, which is consumed by steel plants in that territory, nor of scrap in the South, some of which flows to plants along the Ohio River.

Considerable Scrap Being Held for Higher Prices

Much of the scrap now stored by producers and dealers is being held for higher prices, and will not be sold until the market has strengthened considerably. While stocks are ample for some time to come, an artificial scarcity could easily result in some districts if steel production should at any time in the next several months increase rapidly. Not much new scrap is being produced, although output probably is keeping pace with current small consumption.

Efforts of consumers to obtain scrap at the lowest possible delivered costs have stimulated water movements in the past year. Not only has there been a continuation of shipments on the Great Lakes and on the New York State barge canal, but ocean barges have moved material from New England to Philadelphia. One eastern Pennsylvania plant has received a large proportion of its scrap in this way in recent months. This New England scrap could not have been moved to eastern Pennsylvania by rail at delivered prices that would have competed with local scrap. What the effect of such water movements

Lake Ore Movement Smallest Since 1886

Shipments of Lake Superior iron ore by water in the 1932 shipping season amounted to only 3,567,985 tons, the lightest since 1886, when 3,476,501 tons was brought down. In those days the Lake Superior district was in its early development, and the Mesabi range had not been opened. In 1931 shipments amounted to 23,467,786 tons, while during the peak movement of 1929, 65,204,600 tons was shipped to lower Lake ports.

The decline in American imports of iron ore was not nearly so great, 534,196 tons having entered the country in the first 10 months of the year, compared with 1,281,736 tons in the corresponding 1931 period. As was the case in 1931, Chile furnished the largest part of our imports, with Soviet Russia and Cuba in second and third position.

upon the future of scrap transportation will be remains to be seen. In normal times it may result in higher prices at point of shipment for scrap that is a considerable distance from consuming plants.

Railroad Buying Smallest in this Century

RAILROADS were a poor third among the three principal steel-consuming groups in 1932. The automobile industry was in first place, having taken 17 per cent of all of the finished steel produced, as is shown by detailed figures published elsewhere in this issue. Building construction was second, at 16 per cent, while the railroads took only 12 per cent. Tin plate and other steel used for containers amounted to 11.5 per cent of all finished steel produced last year against 9 per cent in 1931.

RAILROAD buying of iron and steel in 1932 was the lightest in the twentieth century. Early resumption of large-scale purchases is not in prospect. The virtual absence of the rail carriers from the market obviously is one of the chief reasons for the tremendous sag in the steel industry.

To say that a heavy potential demand has been built up, portending a sharp rise in operations on railroad requirements when traffic returns to a sound footing, carries the hazard of prophecy. There are important elements which challenge such a view. Railroads throughout the country are in the "red" and some of them, mainly small lines, are in receivership. The passing of dividends is painfully felt by the American public. For 878,000 individuals hold railroad stock of Class I carriers approximating $7,000,000,000 of par value. Railroad bonds, approximately nearly $12,000,000,000 of par value, are even more widely distributed. More than one-half, or $6,000,000,000, are in the hands of public and semi-public institutions. Funded debt has increased more rapidly than capital stock.

Railroads point to these as some of the obligations with which they are confronted. Attention must be given to them and every reasonable economy effected before entering upon purchases of any but bare necessities. The carriers say they are making only one exception to this policy. This relates to the use of their own funds or "work loans" from the Reconstruction Finance Corporation in order to provide employment. As a stimulant to the iron and steel industry, materials bought for the purpose have been of mild influence only.

Economic Position of the Railroads Must be Restored

It is evident that the railroads must get back more nearly to their outstanding position in the economic structure of the nation before they are profitable to themselves or a source of large tonnage requirements so eagerly awaited by the steel industry, which shares in deficits and passing of dividends. It may be said, too, that the position of the railroads as buyers of steel, metal-working equipment and the wide range of other supplies they use probably will be more highly organized, better balanced and more economic in the future than it has been in the past.

This is indicated by the complaints coming from the carriers and efforts made to become a going concern again. Their latest presentation deals with "The Transportation Problem of the United States." It was prepared by the Association of Railway Executives and the American Railway Association at the request of the National Transportation Committee, headed by former President Calvin Coolidge. The report was filed with the committee in New York early in December. It consists of two parts. One gives an analysis of the railroad situation; the other carries recommendations as to policy.

Four recommendations are made for legislation at the present session of Congress. It is doubted that any of them will be enacted at this session. There is a possibility, if not a probability, that President-elect Roosevelt will ask for action on the railroad problem at an extra session after March 4.

Put briefly, the recommendations are:

Amendment of the Reconstruction Finance Corporation act to provide loans upon easier terms than now prevail.

Repeal of the recapture clause of the Interstate Commerce act.

Regulation of commercial vehicles on the highways and of waterborne traffic.

Retirement of the Government from the business of transportation on the inland waterways and permission for the railroads to engage in water transportation on the same terms that are permitted to all other interests.

Then it is requested that a later Congress pass legislation on consolidations or unifications of the railroads. Advantages pointed to from such legislation are emphasized and include standardization and cooperation in transportation with resulting important economies.

A Greater Transportation System May be Evolved

These things must be done, the railroads say, if they are to remedy their condition, which is attributed to the existing depression, restrictive regulation, burdensome wage scales, excessive taxation and to a substantial extent to the inroads made upon their traffic by what the carriers call unregulated and subsidized competitors.

It will be seen that the railroad system, with the possibility of far-flung sections on the water and in the air, may well become a buying power of few units only and greatly different from the railroad system of today.

The railroads have, of course, already undergone gradual but profound transformations that are reflected in demand for requirements. They have proceeded to a certain degree in effecting consolidations, acquiring water, highway and air lines and improving terminal operations. They have brought about other far-reaching economies.

Greater consolidations certainly are to be expected in the near future through supplemental Federal legislation, carrying with it further centralization of buying power and added economies. The taking over of water, highway and air lines in an urgent move to meet competition is quite conceivable. This would denote the possible expansion of purchases but by fewer buyers and careful marketing with all the power of economy that implies. On the other hand, duplications would be done away with, meaning the scrapping of trackage, terminals and other properties that now represent heavy costs.

Many Economies and Greater Efficiency Have Been Developed

Research has effected many economies. It has developed marked improvement in mechanical construction of rolling stock. It has improved the quality of steel rails. It has developed a plan for chemical treatment of water to prevent locomotive water boiler corrosion and to preserve ties. It has conserved fuel, brought out a new standard of freight couplers which will prolong their life by at least five years, and improved air brakes and draft gear. A lighter freight car has been designed and has adequate structural strength without the use of the higher-priced aluminum alloys, etc. Better packing has reduced damage claims. Locomotives have greater tractive power. Cars have greater capacity. Trains move more speedily, with more cars.

All of these and many other efficiencies have a direct bearing on requirements. They are points of high importance, indicating further devel-

opments affecting the future relation of the railroads as consumers of iron and steel, non-ferrous metals, metal-working machinery, etc.

Turning to the immediate situation, carriers not only find themselves in serious financial straits and are buying only pressing requirements or to simply provide work, but point out that there is a wide gap between rolling stock reserves and traffic demands. This gap, it is explained, must be bridged before large-scale purchasing may be expected. No widespread scrapping of old rolling stock and shop equipment seems likely.

Surplus Equipment Still Large

Freight traffic in 1932 was down almost 50 per cent under that of the peak movement in 1929 and about 25 per cent below the poor year of 1931. Surplus cars and locomotives are at a high level, though showing substantial reduction from the maximum of 772,565 cars and 11,660 locomotives on June 30, 1932. On Oct. 1 of last year the number of surplus cars was reduced to 598,622, while the number of surplus locomotives fell to 10,174, and the situation has not varied much since that time.

These excesses of cars and locomotives exist despite the small number put into service. In the first nine months of 1932, the number of new freight cars put into service was but 2679. For the year 1931 the number was 12,662. In 1923 cars put into service totaled 196,366. Freight cars on order on Oct. 1 of last year were only 1275, comparing with 5427 on Oct. 1, 1931, and 64,601 on Oct. 1, 1923. New locomotives put into service in the first nine months of last year fell to only 36. For the year 1931 the number was 124 against 4037 in 1923. Locomotives on order Oct. 1 of last year were but four as compared with 27 on Oct. 1, 1931, and 1242 on Oct. 1, 1923.

As to steel requirements, one of the bright spots is the situation as to cars and locomotives awaiting repairs. Records of the Car Service Division of the American Railway Association show that on Oct. 1, 1932, more cars and locomotives were in need of repairs than at any previous time in the 10-year period, 1923-32. Freight cars needing repairs on Oct. 1 of last year totaled 262,153, or 12.4 per cent of the aggregate number of cars owned by Class I railroads. The previous high on a corresponding date was 206,044 in 1924. The number of locomotives awaiting repairs on Oct. 1, 1932, totaled 8875, or 17.1 per cent of all locomotives owned by Class I carriers. On Oct. 1, 1931, the total was 6310.

R. F. C. Loans Total $53,144,460

Reconstruction Finance Corporation loans made in the first 10 months of last year to railroads for additions and betterments amounted to $53,144,460, according to the Interstate Commerce Commission. "Work loans" from the same source up to that date aggregated $7,200,000, but some have been subsequently granted. Loans made by the Railroad Credit Corporation, amounting to $10,064,942, need not be considered since they were not used for purchase of materials.

Among the major R. F. C. loans was $27,500,000 granted the Pennsylvania to complete the New York-Washington electrification project. The steel industry has felt but little reaction from this loan. Apparently tonnages so far affected are largely in the nature of releases of material that had already been rolled or otherwise manufactured. Sizable loans for new construction also were made to the New York Central to complete a program of improvements in New York and to the Denver & Rio Grande Western to enable it to finance construction of the so-called Dotsero cut-off in Colorado. This latter project, however, involved only about 950 tons of structural steel.

"Work loans" are used to finance repair of old and building of new equipment in shops of the borrowing carriers. Tonnages are not large and when placed are widely distributed Some of the work is to be spread over a long period of time. The awards therefore have given little impetus to the mills.

Included among the more important "work loans" are the following:

Baltimore & Ohio, $3,000,000, to build 820 new all-steel gondola cars; repair and rebuild 165 locomotives; repair 2500 freight cars.

New York Central, $2,500,000, to repair 10,000 steel box cars and 3000 automobile box cars. Work to be spread over three years. Permission given to modify program, if conditions require it, reducing the number of box cars to be repaired to 7500, eliminating automobile box cars and substituting 4000 hopper cars and 1000 stock cars. Also to substitute for the hopper cars certain passenger and freight locomotives, repairs to locomotives being estimated at $9000 each.

Pennsylvania, $2,000,000, to build 925 all-steel box and 360 automobile box cars. Requirements include 9000 tons of plates and 6000 tons of shapes and bars. Distributed among a number of mills, principally in eastern Pennsylvania.

New York, New Haven & Hartford, $700,000, to repair 93 locomotives and 160 freight cars.

Central Railroad of New Jersey, $500,000, to repair 15 locomotives, 180 freight and 11 passenger cars.

The Reading Railroad also has distributed about 4000 tons of plates and shapes among eastern Pennsylvania mills for repair work on 3700 freight cars and 578 locomotives.

Equipment Programs Solely to Aid the Unemployed

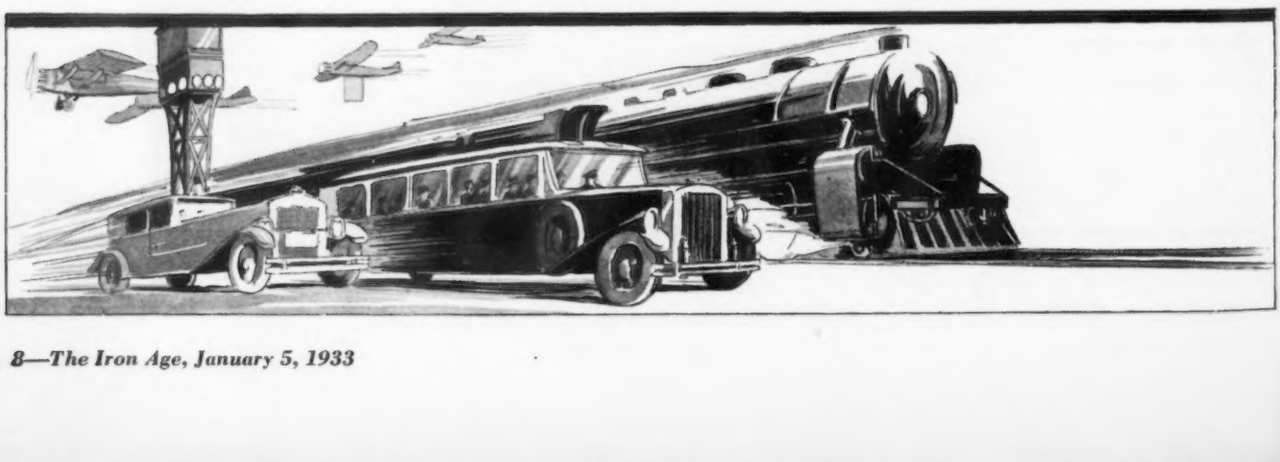
Railroads have almost invariably stated in applications for loans that the programs were being proposed simply as a means of providing employment and not because of traffic necessities. It is clear, therefore, no large purchases either for repair work or new rolling stock are in contemplation. The greatest needs probably are steel rails and track accessories, which were bought in extremely small lots last year.

"Adequacy of railway equipment to meet possible future increase in traffic is a subject open at all times to economic analysis," says the report of the carriers made to the National Transportation Committee. "More modern equipment, together with greatly improved service, has enabled rail carriers to reduce the number of locomotives and cars in active use, and at the same time to increase their capacity and power and their ability to meet traffic demands.

"While the railways had on hand in 1932 a large surplus of locomotives and cars, mainly due to the economic depression, they are ready to handle any increase in demand for transportation service that may be conceivably expected over a future period of years."

It will be seen that modernized equipment has been an important element in the reduction of financial out-

(Continued on page 11)



Steel

CHANGES of a striking character occurred in the production and distribution of finished steel last year. With finished steel output only about 10,000,000 tons, sheets became the leading tonnage item, displacing bars, which have held first place during the 11 years in which such distribution figures have been compiled by THE IRON AGE.

Among the outlets for steel, the automobile again took first position, a place held by it in 1928 and 1929, the manufacture of motor cars having taken 17 per cent of all the finished steel produced, against 16 per cent in 1931. Consumption of steel for building construction and by the railroads shrunk more heavily than steel consumption as a whole. Buildings took 16 per cent, but the railroads used only 12 per cent, or the smallest percentage total over the entire period for which figures are available.

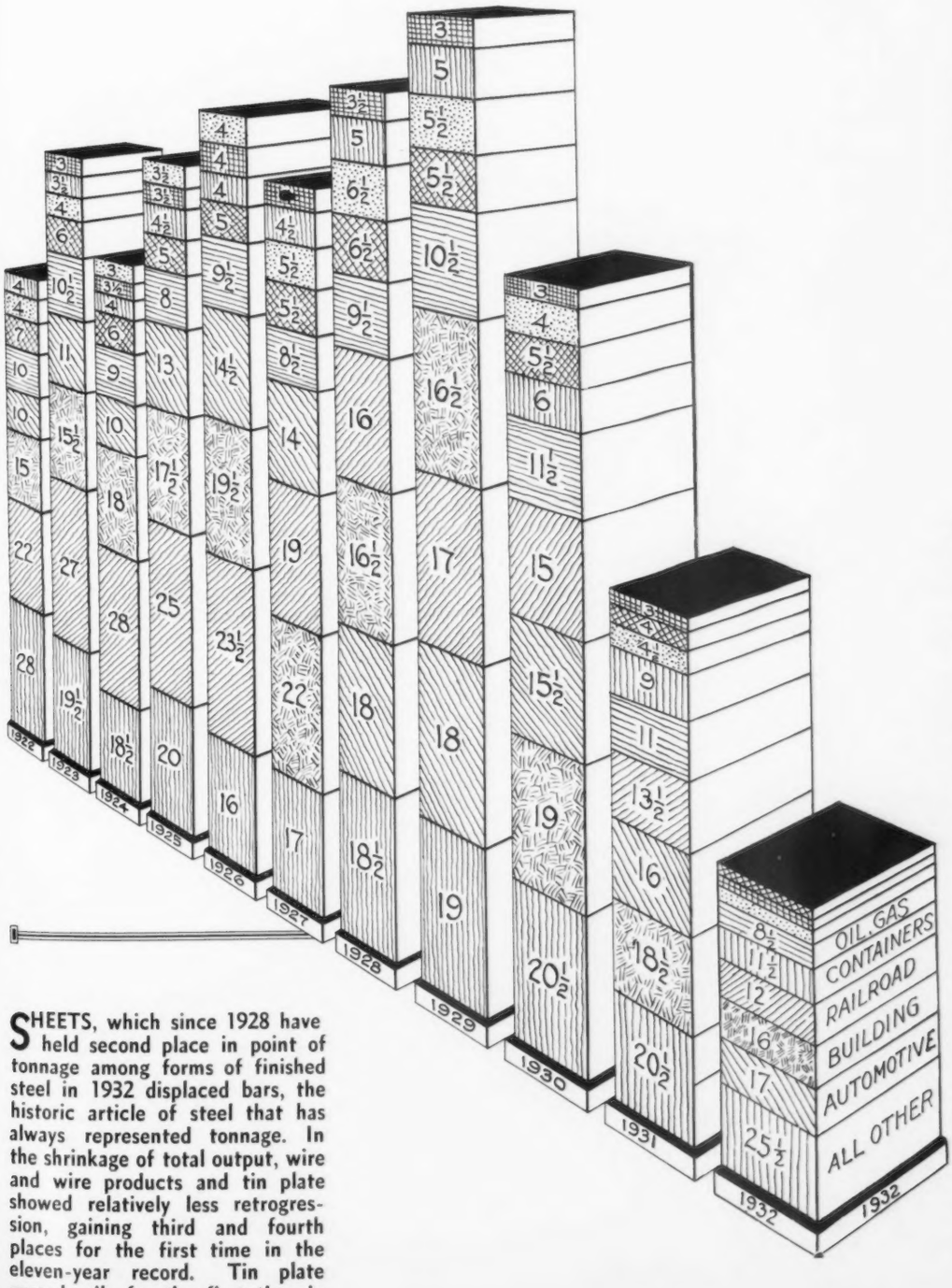
Metal containers not only forged ahead of the oil, gas, mining and allied consuming fields, but jumpe their 6 per cent place in 1 their 9 per cent place in 1931 per cent last year. Exports other hand, dropped to the low tion they have held in the years.

Fifty-five companies helped canvass covering 9,197,500 gr

Prod

	1922 M. Tons	1922 Per Cent	1923 M. Tons	1923 Per Cent	19 M. Tons
Rails	2,172	8.5	2,905	9.0	2,433
Plates	3,417	13.4	4,165	12.9	3,147
Black plate for tinning	1,267	5.0	1.499	4.6	1,415
Other sheets	3,245	12.7	3,828	11.8	3,492
Strips	....	..	....	..	....
Wire rods	2,654	10.4	3,075	9.5	2,522
Shapes	2,717	10.6	3,404	10.5	3,283
Bars, merchant	3,661	14.3	5,148	15.0	4,022
Bars, concrete	575	2.3	680	2.1	656
Skelp	2,640	10.3	3,517	10.9	3,005
Hoops, bands, cotton ties	491	1.9	566	1.8	473
Track accessories	559	2.2	729	2.3	594
Other finished products	2,150	8.4	2,805	8.7	2,344
Totals	25,548		32,321		27,386

* Average of six years ended with 1931.



SHEETS, which since 1928 have held second place in point of tonnage among forms of finished steel in 1932 displaced bars, the historic article of steel that has always represented tonnage. In the shrinkage of total output, wire and wire products and tin plate showed relatively less retrogression, gaining third and fourth places for the first time in the eleven-year record. Tin plate passed rails for the first time in 1931.

Distribution of Rolled Steel in Am

	Rails	Track Accessories	Pl
Railroads	321.6	151.4	6
Automotive	....	.1	4
Shipbuilding	....	....	4
Highways	....	....	
Buildings	.3	....	13
Hardware, household goods, etc.	....	....	
Metal furniture	....	....	
Agriculture	....	....	
Mining, quarrying	17.8	6.2	
Oil, gas, water (prod., transp.)	.3	....	8
Containers	....	....	
Machinery	.1	.2	19
Bolts, nuts, rivets, etc.	....	....	
Electrical manufactures	....	....	
Power and transmission	....	....	48
Jobbers and warehouses	1.2	2.8	46
Exports	16.7	2.5	21
Miscellaneous	2.3	.9	79
Total of 41 companies	360.3	164.1	595
Estimated total all companies	375	...	7

*Includes flats, commonly grouped with strips.

DIST

	1922 M-tons	1922 %	1923 M-tons	1923 %	1924 M-tons	1924 %	M-
Buildings	3850	15	5000	15½	4900	18	5
Railroads	5600	22	8700	27	7700	28	8
Automotive	2550	10	3550	11	2700	10	4
Oil, Gas, Mining	2550	10	3400	10½	2450	9	2
Metal Containers	1000	4	1150	3½	1100	4	1
Agriculture	1000	4	1300	4	820	3	1
Shipbuilding	....	..	....	..	....	..	
Machinery	....	..	950	3	960	3½	1
Exports	1800	7	1950	6	1650	6	1
Highways	....	..	....	..	....	..	
Miscellaneous	7150	28	6300	19½	5100	18½	6
Total	25,500		32,300		27,380		32,6

* Average of nine years ended with 1931.

Steel Consumed in 1932

consuming fields, but jumped from their 6 per cent place in 1930 and their 9 per cent place in 1931 to 11½ per cent last year. Exports, on the other hand, dropped to the lowest position they have held in the past 11 years.

Fifty-five companies helped in the canvass covering 9,197,500 gross tons of finished steel and 1,267,000 tons of semi-finished steel. Returns from 45 companies distributed their 1932 shipments in whole or in part according to major consuming industries. Figures thus apportioned came to a total of 9,029,000 tons, or close to 90 per cent of the year's output.

One of the accompanying tables gives the composite total of the distribution of 41 companies (the returns from four companies having arrived as this survey was going to press). With these figures from 41 companies as a basis, the accompanying tables, showing last year's output of various forms of finished steel and also the estimated consumption by industries,

Production of Finished Steel (Thousands of Gross Tons)

	1922		1923		1924		1925		1926		1927		1928		1929		1930		1931		Av. o
	M. Tons	Per Cent	M. Tons	Per Cent	M. Tons	Per Cent	M. Tons	Per Cent	M. Tons	Per Cent	M. Tons	Per Cent	M. Tons	Per Cent	M. Tons	Per Cent	M. Tons	Per Cent	M. Tons	Per Cent	M Ton
....	2,172	8.5	2,905	9.0	2,433	8.9	2,785	8.5	3,218	9.2	2,806	8.7	2,647	7.1	2,722	6.7	1,873	6.5	1,158	6.1	2,47
....	3,417	13.4	4,165	12.9	3,147	11.5	3,750	11.5	4,195	12.0	3,718	11.5	3,912	10.5	5,018	12.4	3,662	12.5	1,965	10.4	3,69
ng..	1,267	5.0	1.499	4.6	1,415	5.2	1,632	5.0	1,762	5.1	1,657	5.1	1,792	4.8	1,699	4.2	1,692	5.8	1,431	7.5	1,58
....	3,245	12.7	3,828	11.8	3,492	12.8	4,384	13.4	4,561	13.1	4,245	13.1	5,296	14.2	5,716	14.1	3,713	12.7	2,642	13.9	4,11
....	....	..	....	..	....	..	....	..	1,222	3.5	1,318	4.1	2,161	5.8	2,503	6.2	1,941	6.6	1,620	8.5	*1,79
....	2,654	10.4	3,075	9.5	2,522	9.2	2,844	8.7	2,722	7.8	2,770	8.5	3,080	8.3	3,134	7.7	2,347	8.0	1,844	9.7	2,69
....	2,717	10.6	3,404	10.5	3,283	12.0	3,604	11.0	3,912	11.2	3,742	11.6	4.096	11.0	4,778	11.8	3,512	12.0	2,063	10.9	3,51
....	3,661	14.3	5,148	15.0	4,022	14.7	5,369	16.4	5.221	15.0	4,682	14.5	6,413	16.4	6,306	15.5	4.043	13.9	2,391	12.6	4,69
....	575	2.3	680	2.1	656	2.4	818	2.5	814	2.3	814	2.5	951	2.6	952	2.3	850	2.9	644	3.4	77
....	2,640	10.3	3,517	10.9	3,005	11.0	3,051	9.4	3,575	10.3	3,263	10.1	3,229	8.7	3,366	8.3	2,568	8.8	1,429	7.5	2,96
ties	491	1.9	566	1.8	473	1.7	560	1.7	544	1.6	499	1.5	559	1.5	586	1.4	126	.4	113	.6	45
....	559	2.2	729	2.3	594	2.2	781	2.4	915	2.6	828	2.6	750	2.0	889	2.2	590	2.0	385	2.0	70
cts..	2,150	8.4	2,805	8.7	2,344	8.6	3,081	9.5	2,157	6.2	1,992	6.2	2,591	7.0	2,914	7.2	2,280	7.8	1,302	6.9	2,36
....	25,548		32,321		27,386		32,659		34,819		32,334		37,177		40,597		29,197		18,987		31,10

ears ended with 1931.

Distribution of Rolled Steel in 1932, According to Shipments of Companies Producing 85 Per Cent of the Year's Output

Amount of Each Form (in Thousands of Gross Tons), Taken by Different Industries

	Rails	Track Accessories	Plates	Structural Shapes	Bars	Hoops, Bands, Cotton Ties	Black Plate for Tinning	All Other Black Plate and Sheets	Strip Steel	Tubes and Pipe	Wire Products	All Other Finished	Billets and slabs	Sheet and Tin Bars	Wi Ro
.....	321.6	151.4	65.6	102.7	54.5	4.6	....	30.0	2.0	8.2	12.6	81.8	11.9	3.4	4
.....	....	.1	40.7	7.3	339.3	133.2	.6	318.4	272.6	2.4	32.4	5.9	36.4	76.6	9
.....	....	....	40.5	11.4	6.4	.3	....	1.5	....	.8	.7	1.7	2.2	....	
.....	....	....	3.1	83.2	133.1	....	....	7.2	1.1	....	24.0	7.7	1.3	....	
.....	.3	....	131.4	576.9	137.5	8.7	1.0	63.7	8.7	18.4	36.8	12.1	2.6	35.1	42
oods, etc.	....	....	.2	.9	11.5	11.4	6.3	80.1	11.6	.5	6.9	3.6	.2	....	..
.....	....	....	.2	1.6	3.7	6.3	1.0	49.1	7.3	2.4	45.1	.2	.3	....	..
.....	....	....	3.2	1.8	36.6	33.8	....	14.9	4.5	.3	83.7	.7	7.3	....	37
.....	17.8	6.2	5.8	3.5	2.7	4.1	....	4.5	.1	1.0	5.5	3.5	....	....	..
transp.)	.3	....	83.8	8.0	3.7	1.3	5.5	28.7	.1	173.0	3.7	8.8	3.8	....	
.....	....	....	2.5	.3	1.3	21.4	809.5	84.1	7.1	.3	10.4	.2	1.1	50.8	3
.....	.1	.2	19.8	13.8	56.4	3.5	.1	19.4	3.6	8.2	4.6	3.9	3.6	....	1
.....	....	....	....	.4	62.7	.4	....	.2	.4	.8	34.7	2.0	10.2	....	16
.....	....	....	8.7	2.3	8.7	1.7	.1	48.5	18.5	16.6	.9	4.2	1.1	3.0	2
.....	....	....	48.2	18.8	5.1	.7	....	15.1	....	2.4	.2	.3	....	....	..
.....	1.2	2.8	40.3	70.3	129.3	11.4	49.8	337.1	24.8	273.3	287.6	14.3	2.9	....	1
.....	16.7	2.5	21.7	27.3	19.4	3.9	64.6	48.4	8.7	39.9	28.8	4.7	.8	....	12
.....	2.3	.9	79.7	23.5	152.5	26.6	50.0	197.4	141.0	17.7	218.9	15.8	52.6	11.3	80
nies	360.3	164.1	595.4	954.0	1164.4	273.3*	988.5	1348.3	512.1	566.2	837.5	171.4	138.3	180.2	213
companies	375	...	700	1025	1425	75	1050	1800	950	600	1150	850	....	....	..

nonly grouped with strips.

DISTRIBUTION OF FINISHED STEEL (THOUSANDS OF GROSS TONS)

22		1923		1924		1925		1926		192 7		1928		1929		1930		1931		Aver
ns	%	M-tons	%	M-tons	%	M-tons	%	M-tons	%	M-tons	%	M-tons	%	M-tons	%	M-tons	%	M-tons	%	M-to
) 15		5000	15½	4900	18	5700	17½	6800	19½	7100	22	6100	16½	6700	16½	5500	19	3500	18½	551
) 22		8700	27	7700	28	8200	25	8200	23½	6100	19	6000	16	6900	17	4400	15	2550	13½	643
) 10		3550	11	2700	10	4200	13	5000	14½	4500	14	6700	18	7300	18	4500	15½	3050	16	440
) 10		3400	10½	2450	9	2600	8	3300	9½	2750	8½	3500	9½	4300	10½	3350	11½	2100	11	303
) 4		1150	3½	1100	4	1500	4½	1400	4	1450	4½	1850	5	2000	5	1750	6	1700	9	149
) 4		1300	4	820	3	1150	3½	1400	4	1800	5½	2400	6½	2250	5½	1150	4	850	4½	141
..	..	....	..	....	..	....	..	....	..	....	..	....	..	....	..	....	..	....	..	...
..	..	950	3	960	3½	1150	3½	1400	4	1300	4	1300	3½	1200	3	900	3	600	3	*108
) 7		1950	6	1650	6	1650	5	1750	5	1800	5½	2400	6½	2250	5½	1600	5½	750	4	176
..	..	....	..	....	..	....	..	....	..	....	..	....	..	....	..	....	..	....	..	...
) 28		6300	19½	5100	18½	6500	20	5600	16	5500	17	6900	18½	7700	19	6000	20½	3900	20½	606
80		32,300		27,380		32,650		34,850		32,300		37,150		40,600		29,150		19,000		31,08

* Average of nine years ended with 1931.

2

the dis-
e returns
arrived
press).
mpanies
g tables,
various
also the
dustries,

have been worked out. A compilation of all figures for the years since 1921 is also presented.

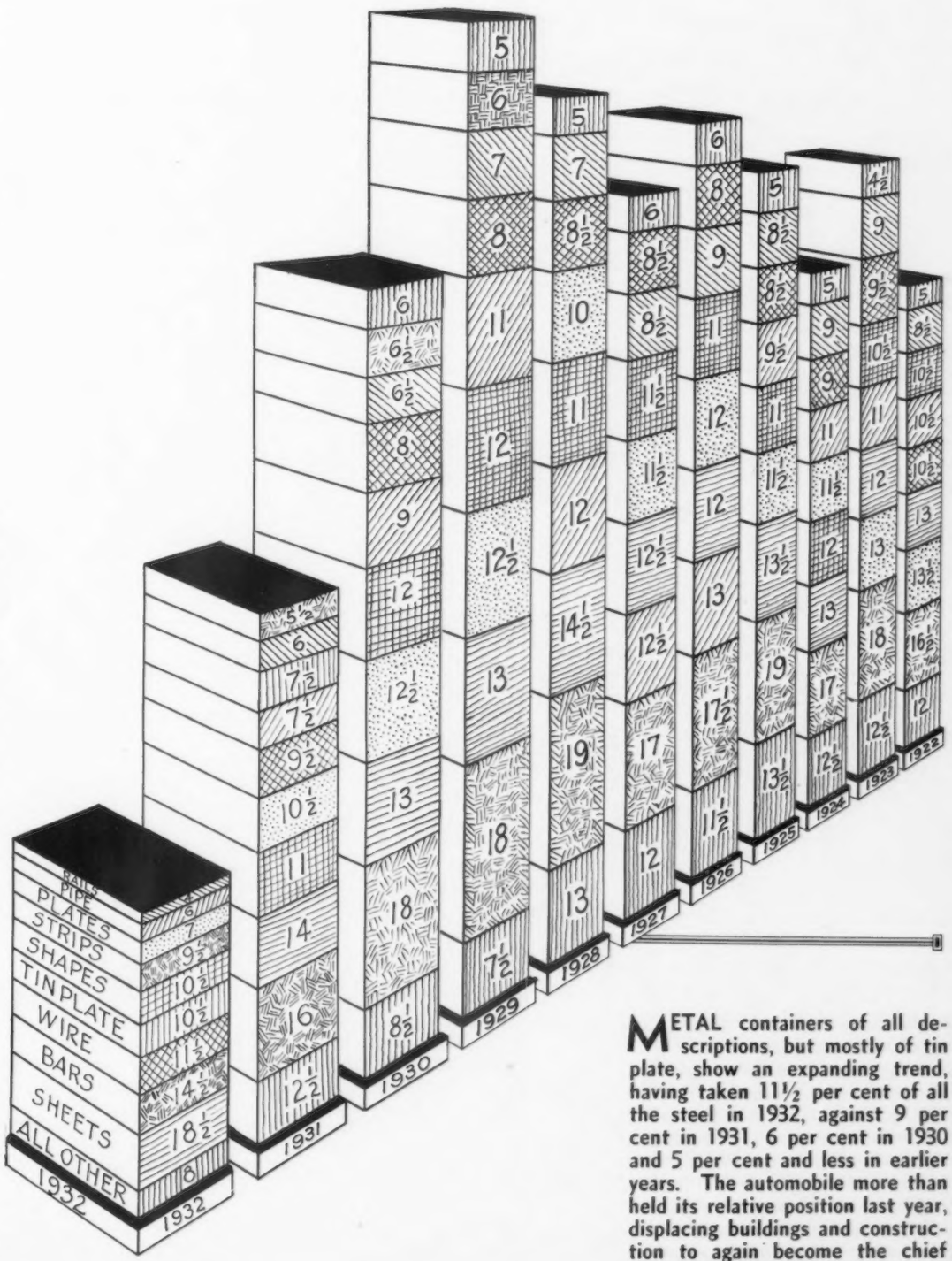
While finished steel production showed a falling off in 1932 from 1931 of about 47 per cent, tin plate output was reduced only 28 per cent and sheets in general 31 per cent. Structural shapes and bars receded to an extent about equal to the slump of the industry as a whole, while plates and pipe showed a reduction of about 57 per cent. Rail output was about two-thirds off from that of 1931. Trade in wire products was one of the relatively brighter spots, the decline from the previous year's production having been only about 36 per cent. Jobbers took about 14.8 per cent of the year's total, but in the accompanying calculations the jobber tonnage has been redistributed among the various consuming industries in the proportions shown by steel companies' reports of their own direct shipments.

—1931—		Av. of 10 Yrs.		—1932—	
M. Tons	Per Cent	M. Tons	Per Cent	M. Tons	Per Cent
,158	6.1	2,472	7.9	375	3.8
,965	10.4	3,695	11.9	700	7.0
,431	7.5	1,585	5.1	1,050	10.5
,642	13.9	4,112	13.2	1,850	18.6
,620	8.5	*1,794	*5.6	950	9.5
,844	9.7	2,699	8.7	1,150	11.6
,063	10.9	3,511	11.3	1,025	10.3
,391	12.6	4,696	15.1	1,100	11.1
644	3.4	775	2.5	325	3.3
,429	7.5	2,964	9.5	600	6.0
113	.6	452	1.5	75	.8
385	2.0	702	2.3	150	1.5
,302	6.9	2,361	7.5	600	6.0
.987		31,102		9,950	

r's Output

ts	Sheet and Tin Bars	Wire Rods	Skelp	Totals
abs	3.4	4.9	....	855.2
	76.6	9.4	.2	1275.5
	....	.5	....	66.0
	....	.2	....	260.9
	35.1	42.5	9.4	1085.1
	....	....	....	133.2
	....	....	....	117.2
	....	37.0	....	223.8
	....	....	....	54.7
	....	.4	14.5	335.6
	50.8	3.9	....	992.9
	....	1.2	....	138.4
	....	16.9	....	128.7
	3.0	2.1	....	116.4
	....	....	....	90.8
	....	1.3	....	1246.4
	....	12.3	1.7	301.4
	11.3	80.4	8.2	1078.8
	180.2	213.0	34.0	8501.0
	....	....	....	10,000

1931		Aver. of 10 yr.		1932	
ons	%	M-tons	%	M-tons	%
500	18½	5515	17.7	1598	16
550	13½	6435	21.0	1212	12
950	16	4405	14.1	1708	17
100	11	3030	9.7	840	8½
700	9	1490	4.8	1170	11½
850	4½	1412	4.5	334	3½
...	..	....	..	96	1
300	3	*1085	*3.4	276	3
750	4	1760	5.7	346	3
...	..	....	..	410	4
900	20½	6065	19.5	2056	20½
000		31,088		10,046	



METAL containers of all descriptions, but mostly of tin plate, show an expanding trend, having taken 11½ per cent of all the steel in 1932, against 9 per cent in 1931, 6 per cent in 1930 and 5 per cent and less in earlier years. The automobile more than held its relative position last year, displacing buildings and construction to again become the chief steel consuming industry.

lay for requirements, though of course not the outstanding factor that brought about a contraction estimated by *The Railway Age* at $1,600,000,000 in 1932 under the 1925-1929 annual average for purchase of materials, fuel, etc. It is nevertheless a factor that will become increasingly significant along with the constant pressure for greater efficiency to meet competition.

One of the physical economies is in the direction of rail abandonments with the result that in the 12-year period 1920-1931, abandonments by Class I railroads in the United States exceeded new construction by 418 miles.

"The present tendency of railway mileage development is toward intensive expansion of existing lines," continues the report to the National Transportation Committee. "The steam railway network now covers the country so completely as to serve both producers and consumers. No regions of any considerable importance are without railways. Since 1920, the necessity has been not so much to extend the railway network itself as to fill it out and adapt it to more intensive utilization."

Automobile Industry Has Poorest Year Since 1918

WITH production in the United States and Canada estimated at only 1,430,000 units for 1932, the automobile industry has ended its worst year since 1918. Its output was 57 per cent of the 2,472,359 cars manufactured in 1931, and 25 per cent of the 5,621,715 turned out in the peak year of 1929. Of the year's assemblies, about 1,200,000 were passenger cars.

As usual, almost two-thirds of the total production was in the first half of the year, May having been the high spot when 192,505 units were assembled. The seasonal decline, which normally occurs in June, was postponed a month owing to the fact that the Ford Motor Co. at that time was at the height of its manufacturing program on its V-eight car. As in 1931, the final month of the year brought a sharp increase in activities due to the building of new models. However, it is only in the last three years that December's performance has bettered that of November, a considerable decline having been registered in previous years.

On various occasions during the year, notably in April and May and in November and December, automotive demand for steel bolstered the operation of steel mills at a time when they needed the tonnage most. Steel makers at Detroit and Cleveland especially benefited during these peak periods.

In contrast with the over-production of previous years, motor car companies in 1932 pursued consistently a conservative policy of synchronizing assemblies with sales. In fact, some companies were ultra-conservative. General Motors, for example, sold 46,246 more units than it made in the 12 months ended Nov. 30, 1932. The result of this cautious program is that the industry is entering 1933 with the lowest dealers' stocks in history, both of new and used cars.

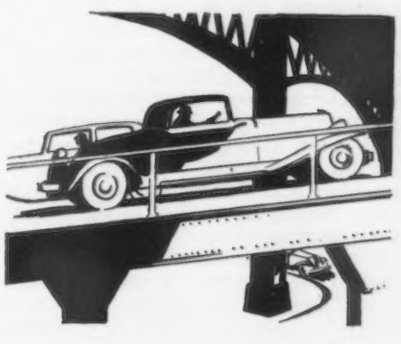
Industry Introduces Drastic Production Economies

For years the retail selling price of automobiles has been steadily decreasing, and 1932 proved that the depression had hit heavily the average motorist, and a larger percentage of buyers than normal were involuntarily thrown into the low-price market. At the same time that selling prices were being cut, manufacturers found that costs were mounting owing to restricted volume of output, and drastic production economies were instituted. Among them was the drawing in of work formerly allotted to outside suppliers and the concentration in southern Michigan of all the manufacturing divisions of the large automobile corporations. This was especially true of General Motors Corpn. and Chrysler Corpn.

Mechanical Changes Mainly in the Transmission

General Motors maintained its position by selling about 42 per cent of the industry's total, as it did in 1931. Chevrolet retained first position in passenger car sales, having sold 305,741 cars in the first 10 months of the year (the period for which completed records are now available), against 232,103 for Ford. However, Ford led the country in both passenger car and commercial car sales in the month following the introduction of the V-eight model and continued to lead in commercial car sales for the year. On account of the unusual showing made by its Plymouth division, which sold more cars in 1932 than in 1931, the Chrysler Corpn. increased its share of the industry's business during the year.

Mechanical changes in 1932 cars were mainly in the transmission, every manufacturer having attempted to eliminate as much noise as possible in the shifting of gears. The Ford Motor Co. did a complete tooling-up job early in the year for its V-eight car. Few mechanical alterations have been made in 1933 cars, which differ from the previous year's models principally in body lines.



Dealer Mortality High

The year's knottiest problems for automobile executives were in maintaining adequate and efficient retail outlets. Dealer mortality was high. General Motors protected its interests by consolidating the sales of its Buick-Olds-Pontiac divisions and permitting strong, experienced dealers to combine the agencies for two or more of its lines. The Ford Motor Co. started at Buffalo a factory retail sales and service station for the purpose of supplementing and helping the efforts of dealers and announced that others would be established at strategic points. Near the year-end, Continental Automobile Co. announced that it would sell its new four-cylinder car through its own direct retail branches, or "terminals."

Realizing that 1933's course depends on a number of uncertain factors, the automobile industry is loathe to predict what will happen, but the consensus of opinion among executives is that production will be from 1,100,000 to 1,500,000 cars. Lower retail prices are certain to make their appearance by the start of the spring selling season and margins of profit, if any, will be low. This year should bring either the consolidation of some of the smaller independent companies or their elimination. Their survival will depend in large measure on their ability to secure adequate retail outlets.

Sharp Shrinking in Building Construction

BUILDING construction throughout the past year has quite naturally suffered a severe shrinkage because of financial conditions and the surplus of available space in all types of existing buildings. Building contracts in 1932, as computed by the F. W. Dodge Corpn., New York, totaled about $1,500,000,000 compared with about $4,000,000,000 in 1931 and $5,870,000,000 in 1930, but some of the decline in dollar volume is due to lower costs of materials and labor.

Without the support of public expenditures, which accounted for 55 per cent of the 1932 contracts, building construction would, of course, have made a very much worse record. Public projects may be in reduced volume this year owing to the necessity for governmental economies.

Thus far the activities of the Reconstruction Finance Corporation in the financing of self-liquidating projects have given very little impetus to business and employment, although this source of Federal Government aid offers the possibility of greater business stimulation during 1933, as many of the projects for which loans have been granted have not yet been start-

(Continued on Advertising Page 46)

The Steel Industry's Stake in

WHEN Col. James L. Walsh deals with the subject of banking, as related to industry, he knows whereof he speaks.

As the executive vice-president of the Guardian Detroit Union Group, he has come into intimate daily contact with the financial needs of the progressive automotive industry and of the many related industries which serve it. He knows how money works in industry, what it is capable of doing for it and why it is not doing all that it could now.

Trained at West Point and with a brilliant war record, Col. Walsh was virtually "drafted" by business after the war as the man best able to perfect the permanent organization of the Army Ordnance Association. Gen. Harbord has told of him that Pershing's first cablegram to the War Department requested that Walsh be sent to France immediately to straighten out the ammunition supply problem, just as he had previously done in Mexico.

Bankers with whom Col. Walsh associated during the organization of the ordnance districts were quick to realize his unusual analytical ability. As a result, coming into finance with virtually no previous banking experience, he is today, while still a young man, the chief executive officer of one of our most important mid-western banking groups.

BREAKFAST in New York . . . Dinner in Los Angeles . . . 2500 miles between two drinks of water . . . average speed, 200 miles per hr. for 12½ hr. . . . maximum speed, 300 miles per hr. Says Colonel Roscoe Turner in the New York *Times* of Nov. 15, 1932, "The first time I crossed the country in an airplane it took me a week. The next time it took me two days. They tell me I covered the East-West transcontinental trip today in 12 hr. 33 min., with 30 min. of that time spent on the ground in refueling. . . . I have just had my first drink of water since leaving New York this morning at 7:46 o'clock Eastern Standard Time. I'm going home to a good dinner here in Los Angeles. My New York breakfast and Los Angeles dinner clearly show that it is only a one-day trip from one side of our country to the other." Interesting, but of what particular significance to banking? And of what concern to the steel industry?

The iron and steel business is rightfully considered a basic industry, but it, in common with all other productive industries, rests in turn upon the subfoundation of the banking structure. Prosperity cannot be built upon a quicksand of banking instability and resultant credit stringency. The roots of our present difficulties lie deep in the distant past, but, for purposes of this discussion, we need to review only the salient facts and significant trends of the past 10 or 12 years.

The increasing use of the automobile has set in motion economic forces which produced profound changes in our social relationships and in our business structure. Its advent and development created whole families of new industries, and weakened or destroyed entrenched monopolies. It stimulated migrations to suburban and rural communities for residence purposes, dictated the integration of industry into larger units of production, and altered the course of trade and commerce in effecting the distribution of our products. Industrial and commercial activities, which were unhampered by out-moded legal restrictions, gradually readjusted themselves to the new order. However, two agencies, essential cogs in the infinitely complex mechanism of our modern civilization, have lagged far behind in the necessary process of readjustment. Today we are still shackled with the almost intolerable burden of an inflexible, tremendously extravagant "horse and buggy" system of government, and a needlessly weak, ruinously expensive "horse and buggy" banking system—in an automobile age.

When the horse and buggy was the principal means of transportation, the township was an acceptable unit of government, but the automobile has given us a radius of action ten times as great, with less effort and more comfort. Accordingly, the area of a given "neighborhood" is now one hundred times as large as it was a generation ago. Yet we still have, in Michigan, for instance, 6878 school districts, with 27,512 directing officers; 1269 townships, with 15,228 officers; 83 counties, with 1163 officers—not to mention an even greater army of village and city officers and employees. No less than 47,355 elected officials—one for every 18 votes cast for Governor in 1930—are supported, in whole or in part, by the taxpayers. The State of New York has no less than 13,544 local governments; Illinois over 16,000.

Governing units to the number of 250,000 cover these United States of ours—to an average of 11 layers deep—each vested with sovereign power to tax—and therefore to destroy. One hundred thousand legislators grind out an endless stream of laws. Our Federal Government tries its hand at performing some 25,000 distinct functions—at least 80 per cent of them entirely outside the scope of government as conceived by the framers of the Constitution.

Our Confused Banking Laws

Development of our banking system has proceeded substantially along the haphazard lines of our governmental structure—under 50 different sets of banking laws, one for National banks, one for each of the 48 States, and one for the District of Columbia. These 50 separate and distinct banking codes differ from each other in such important particulars as minimum amount of capital required; maximum amount of loan to any single borrower permitted; strictness of examination prescribed; variety and breadth of powers authorized; and standards of character and ability of managing personnel maintained. In general, the requirements of the national system are stricter and more conservative than the 48 different State banking systems. But, the national system is under fire from 48 different quarters, as individual States allow broader and broader powers to banks as an inducement to take out State charters on organization, or by switching from the

ke in Better Banking ▲ ▲ ▲

By Col. James L. Walsh
Executive Vice-president, Guardian Detroit Union Group

▲▲▲

STEEL producers and consumers alike have a tremendous "stake" in our banking system. Many of us have felt that our banks and our bankers have failed to do what they might have done for us during the depression.

Now a progressive banker tells us why we have reason to feel that way and what should be done about it.

"Horse and buggy banking," says Col. Walsh, is out of place "in an automobile age."

Our primitive banking laws, he believes, are responsible, very largely, for the disgraceful record of bank failures made in the U. S. during the depression—and before.

Confidence, requisite for recovery, in Col. Walsh's opinion, will not be regained until we have taken the first steps, at least, toward making our banks as impregnable as those of England, Canada and France, which have gone through the depression without a single failure.

What these steps are is told by the author in the accompanying article.

▼▼▼

national system. All in all, a considerable "competition in laxity" has existed during recent years with the following inevitable tragic results:

BANK SUSPENSIONS IN THE UNITED STATES

First Period	Total	Non-Member of Federal Reserve	Per Cent of Non-Members to Total Failures
Jan. 1, 1921, to Dec. 31, 1929 (9 yrs.)....	5,642	4,648	82
Second Period			
Jan. 1, 1930 to Sept. 30, 1932 (2¾ yrs.)...	4,742	3,776	79.6
Total (11¾ yrs.)	10,384	8,424	81.1

Our banking structure showed undeniable signs of fundamental weakness long before the present depression was even dreamed of. During the first period, business conditions varied from unprecedented prosperity to perceptible, but not abnormal, recession. Certainly, the test was not unusually severe—yet no less than 5642 banks suspended operation. Eighty-two per cent of these closed banks were not members of the Federal Reserve System, and 92 per cent were in towns of less than 10,000 in population. Lacking the ability to stand up in fair weather, it was only to be expected that the effect of unusually adverse economic conditions would be little short of catastrophic. No less than 4742 banks failed in the 2 years and 10 months ended Sept. 30, 1932, 79.6 per cent being non-members of the Federal Reserve System, and approximately 87 per cent being located in towns of less than 10,000 in population.

Small Banks Show High Costs

The high mortality of small-town banks is directly attributable to the fact that small banks are necessarily high-cost banks, which find it practically impossible to set aside out of earnings the necessary reserve to meet the losses which inevitably occur during difficult periods. But weak banks harm not alone their own depositors, and stockholders, and communities. Their destructive effect swings far wider. During the past 10 years, the more than 10,000 closed banks temporarily tied up or permanently wiped out more than $4,345,000,000 of their depositors' funds. This means that an equivalent $4,345,000,000 or more of their assets had to be liquidated to meet the demands of their depositors. Borrowers in these 10,000 closed banks were called upon summarily by receivers to pay up their loans, and failing that, their collateral was thrown on the market for what it would bring. Bonds held by these banks for their own investment as secondary reserve had to be disposed of at sacrifice prices for whatever cash was offered. Naturally, the *prices* of certain perfectly sound issues fell precipitately without regard to intrinsic *values*. Neighboring banks still open but threatened by local hysteria found their holdings of these same issues enormously depreciated—their carefully accumulated secondary reserves could be sold only at terrific losses. With a conflagration raging all about them—they found their own fire-buckets filled, in effect, with gasoline. The necessitous liquidation of over $4,345,000,000 of bonds, stocks, real estate, and commodities previously owned by these 10,000 closed banks was felt in the bond portfolios and loan pouches of every bank in the country. And so it is difficult to agree with the conclusion expressed in the last ten words of the opening paragraph of the Report of the Economic Policy Commission, American Bankers Association, of Oct. 6, 1932, which states:

"It has long been generally admitted that one of the drawbacks and weaknesses of our American Banking System was that we had more banks than were required by the economic needs of the nation. Unfortunate as were the circumstances which brought it about, it can safely be said that there has in recent years been a marked correction of this particular weakness in American banking, for during the past eleven years the number of banks in the United States has been reduced from thirty to twenty thousand through suspensions, consolidations, and voluntary liquidations. In this way many uneconomic units were eliminated, and the position of the remaining institutions was thereby strengthened."

It is true as the report somewhat heartlessly remarks, that "In this way many (10,000) uneconomic units were eliminated," but it certainly does not follow that "the position of the remaining institutions was thereby strengthened." An examination of the bond investment portfolios and the collateral cards of the remaining institutions might support the directly opposite thesis. Even if it were so, isn't $4,345,000,000 of depositors' money a pretty high price to pay for "horse and buggy" banking?—particularly as the report naively explains: "Unfortunately the violence and rapidity with which the process of elimination has operated during the period of the depression, carried it to disastrous lengths that increased general business unsettlement and public alarm. This in turn caused the suspension of many good banks and the ruin of many excellent bankers that would otherwise have weathered the storm. Doubtless, also, many communities have been deprived of the banking facilities for which their business activities present a real need."

Was it necessary to have even a single bank fail, or have even a single dollar of depositors' money tied up or wiped out?—when, according to Sen-

ator Carter Glass of Virginia, in his radio address of Nov. 1, 1932: "England has not had a bank failure in ten years. Her Dominion of Canada, across the St. Lawrence River, has not had a bank failure since 1925. France, during this financial convulsion had not a single bank failure, nor had Italy. Even German and Austrian banks stood up until thousands in the United States had failed."

The tragic record of more than 10,000 bank failures during the past ten years—one-third of the total number of banks in existence in 1921—with a resultant temporary or permanent loss of nearly $4,500,000,000 to the depositor public, as compared with the stability of other banking systems which have come through the same, or even worse, conditions practically without loss of a single dollar of depositors' money, has, naturally, resulted in the bank depositor losing faith in our banking system. Consequently, perfectly sound banks today are under the necessity of maintaining unusual liquidity in order to be in a position to meet the demands of their depositors, however unreasonable. This extraordinary need for liquidity may well be reflected in a general policy to restrict the making of new loans, and to insist upon payment of existing loans at maturity.

During the three years ended June 30, 1932, loans of all banks in the United States decreased from $41,512,000,000 to $27,834,000,000. Furthermore, the fully justified apprehension of the depositor has resulted in hoarding of currency to an amount approximating $1,500,000,000 which might otherwise serve as the base of a credit structure of $15,000,000,000. As long as depositors' fears are justified, just so long will the conservative loaning attitude of banks be continued, and just so much longer will industry and business be compelled to operate on a "cash and carry" basis.

Approaching the Barter Level

For with the iron and steel industry, and its principal customer groups, operating at from 10 per cent to 15 per cent of capacity, the question arises as to whether the volume of business is not rapidly approaching that which can be supported on a strictly "cash" basis—barter levels, in fact.

The iron and steel industry, for example, is currently operating at approximately 15 per cent capacity. One of its largest customer groups—the automobile industry—during October and November, 1932, operated at an annual rate of 660,000 units, as compared with an actual production of 5,621,715 cars and trucks during the calendar year 1929—or approximately 11 per cent. Other large customer groups of the steel industry are restricting their requirements to a corresponding degree. Is it mere coincidence that actual "money in circulation" varies from 10 per cent to 15 per cent of the aggregate deposits of all banks in the United States? On June 30, 1929, actual "money in circulation" approximated $4,800,000,000 at a time when the total deposits of all banks in the United States aggregated $53,852,000,000; and, on June 30, 1932, actual "money in circulation" approximated $5,600,000,000, at a time when the total deposits of all banks in the United States aggregated $41,963,000,000.

There seems to be a growing feeling among manufacturing and merchandising executives that their companies, particularly medium-size and small companies, are currently unable to obtain sufficient bank credit. Credit executives of corporations feel that they are being compelled to assume part of the proper burden and responsibility of the banks through being forced to finance their customers on much longer-term commercial credit than is absolutely sound.

Assuming the justice of these complaints, perhaps they are mistakenly directed at a symptom rather than an underlying cause. A banking system should be so designed as to function effectively not only in times of prosperity but also during times of business depression. Our banking system showed unmistakable signs of weakness even during prospering periods, and its failure to meet current business needs has long been indicated as an inevitable result of its *structural weakness.* As the Secretary of the Treasury stated on Dec. 7, 1932, "the banking structure of the United States needs modification." A structural weakness requires a structural remedy.

"THE fact is that despite the melancholy number of eliminations that has taken place, the country has today far too many banks. Our banking units should on the average be far larger than they are today. The small, ill-capitalized institutions should be merged so as to gain the normal stability, diversity, economy and management of the larger concerns. I repeat what many others have already pointed out, namely, that no thorough-going banking reforms can be brought about until two vital changes have been accomplished. The first is to bring all the commercial banks of the country, small as well as large, under the single aegis of the Federal Reserve System. The second is to establish sensible provisions for regional branch banking, the geographical limits for each region to be carefully worked out and regulated. Then we should have something worth talking about."

—THOMAS W. LAMONT

Finance and Geography

The distinguishing characteristic of our banking system, or, more accurately, lack of system, has been the traditional attitude that the locally owned, directed and managed bank is best fitted to provide the greatest security and service to the public and is most capable of handling the diverse character of industry and trade throughout the whole country. These historic concepts, as enacted into statute law, have tended to preserve local independent unit banking in the face of fundamental economic forces tending toward the greater *geographic integration* of transportation, communication, manufacturing and commerce. According to the Report of the National Industrial Conference Board, published in June, 1932, "the fact that the integration of outlying and country banks could not proceed under existing legal limitations meant an unbalanced development of the banking system, with weakness of incalculable significance persisting in that section inherently subject to wide fluctuations of prosperity."

Bigger and Better Banks

Incompetent bank management, or reckless financial policies, can undoubtedly cause trouble, even if the banking system itself is sound; but the soundest and most conservative bank management in the world cannot escape the penalties incident to *structural* weakness in our banking system. Recommendations for correcting the demonstrated structural weakness of our heterogeneous collection of banking systems point to the need for fewer and larger banks, an objective which most authorities agree can most quickly and effectively be obtained through the granting of authority, by Federal enactment, for national banks to consolidate within the States in which located—the merged banks continuing to provide financial facilities for their communities by operating as branches of the consolidated institution.

Pierre Jay, chairman, Fiduciary Trust Company of New York City, and former chairman of the Federal Reserve Bank of New York, Thomas W. Lamont, partner of J. P. Morgan & Co., and the Honorable Ogden L. Mills, Secretary of the Treasury, are among the many financial authorities who regard the extension of branch banking as prerequisite to stability.

The National Industrial Conference Board, and the Banking Committee of the Chamber of Commerce of the

United States have pointed out the weakness of the independent unit banking system.

In his Annual Report, of Dec. 12, 1932, the Honorable F. G. Awalt, Acting Comptroller of the Currency, states: "Mergers, consolidations, concentrations into larger units, with branches, for purposes of economy in production and distribution and accelerated transportation have resulted in movements of capital and interests from the smaller towns to larger commercial centers. The country banker, therefore, finds his field for loans narrowed as to diversification and many of his former sizeable and profitable balances dwindled to mere payroll balances.

"Handicapped by the conditions referred to above, there is small wonder that so many banks, under incompetent management in many cases and with inadequate diversification, have not been able to withstand the drastic effects of a precipitous deflation. Moreover, we should not lose sight of the effect of the competition in laxity existing in the American banking system, consisting of 48 State systems, in competition with one national system and with little or no correlation."

The stake of the iron and steel industry in strengthening our banking structure is apparent. Nearly $5,000,000,000 of depositors' funds have been either temporarily tied up, or permanently wiped out, and another $1,000,000,000 in bank stockholders' investments have been withdrawn from protective enterprise, during the past decade, in ever-increasing volume down to the present time. As a corollary, lack of confidence in our present 50 different banking systems has resulted in the hoarding of currency to an extent approaching $1,500,000,000, thus precluding the extension of credit on a conservative basis, to the amount of $15,000,000,000. That the steel industry would obtain the greatest share of the benefit from a correction of the factors which caused this $20,000,000,000 vacuum in our economic life goes almost without saying.

The Root of Credit Stringency

But, to return to Colonel Roscoe Turner's epochal twelve-hour flight from New York to Los Angeles, the fundamental economic forces which have, during the automobile age, been "responsible for the unfavorable banking conditions in country bank territory," in the words of Acting Comptroller Awalt, are still operating, and with increased intensity. If these conditions seem appalling to us today, what will be their effect upon banking and business, including the steel business, when commercial aviation shrinks the United States to one-fourth railroad size—a possibility of the immediate future, or to one-eighth railroad size, as Colonel Turner's exploit indicates is not beyond the bounds of possibility.

"GOVERNING units to the number of 250,000 cover these United States of ours—to an average of 11 layers deep—each vested with sovereign power to tax, and therefore to destroy."

"As long as depositors' fears are justified, just so long will the conservative loaning attitudes of banks be continued and just so much longer will industry and business be compelled to operate on a 'cash and carry' basis."

"We should not lose sight of the 'competition in laxity' existing in the American banking system, consisting of 48 State systems in competition with one National system and with little or no correlation."

"Have we the slightest assurance that fundamental conditions have so changed as not to indicate the possible failure of additional banks during the next decade, unless we strengthen, by proper consolidation, the remaining 20,000 units which constitute our banking structure?"

The forces making for still further geographic integration of transportation, communication, manufacturing and commerce, as recently accelerated by developments in aviation, spell the doom of "horse and buggy" government—and "horse and buggy" banking. Have we the slightest assurance that fundamental conditions have so changed as not to indicate the possible failure of additional banks during the next decade, unless we strengthen, by proper consolidation, the remaining 20,000 units which constitute our banking structure? Is not the proper course of the manufacturer or merchant, now unable to obtain sufficient bank credit, to strike at the root of credit stringency by supporting legislation which will strengthen our banking structure, remove the fear of another epidemic of bank failures, and permit the banker to pursue a normal lending policy?

The Vandenberg Amendment

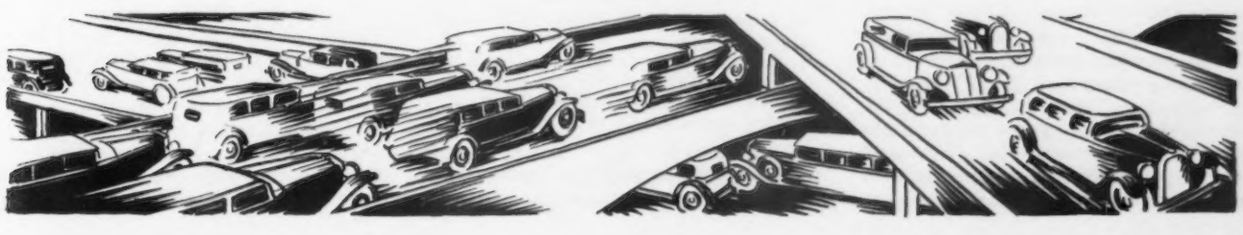
It would appear to be but the promptings of enlightened self-interest for the iron and steel industry to assert itself, in no uncertain terms, in favor of Section 19 of the pending Glass Bill (Senate 4112,) as modified by the Vandenberg amendment, which reads as follows:

"Section 19, Paragraph (c) of Section 5135, of the Revised Statutes as amended, is amended to read as follows:

"(c) A national banking association may, with the approval of the Federal Reserve Board, establish and operate new branches within the limits of the city, town, or village, or any point within the State in which said association is situated. No such association shall establish a branch outside of the city, town, or village in which it is situated unless it has a paid-in and unimpaired capital stock of not less than $500,000. Except in a city, town or village where there is no national or State bank regularly transacting customary banking business, no such association shall establish a branch, except by taking over an existing unit bank, or an affiliate of such association."

The purpose of Section 19, as quoted above, is, fundamentally, to authorize by law the continuance of banking facilities in communities where, due to economic reasons, a small unit bank is finding it difficult to survive; and to authorize the establishment of some sort of banking facilities in cities, towns, or villages which are now without any banking facilities whatsoever.

The present "horse and buggy" banking system must follow the horse and buggy system of transportation into the limbo of outgrown and discarded methods. The depression has shown this to us clearly. Our financial system must be the bedrock of industry and business; a solid, dependable foundation, not a combination of solid rock and shifting quicksands. No industry has been penalized more heavily than the steel industry because of the existence of these weak spots in this basic credit foundation. No industry suffers more today than the steel industry because of our reversion toward the barter levels. And conversely, no industry has more to gain than has steel, from a revision of banking laws which will eliminate the quicksand and give us an impregnable banking base.



Uncle Sam Po
Ivan Goes In

MAN has ever sought El Dorados. Migrations, gold rushes, speculative bubbles, agricultural overproduction and industrial overexpansion have all had as their motive force faith and hope in a better day. The alluring vision that has whipped up the emotions and taxed the energies of man has all too often proved a mirage.

In the 20's the perfection of mass production and the ascendancy of the "high wage" theory created an all-consuming enthusiasm in this country that opened up a new vista of general prosperity and progress. But something went wrong.

In 1928 Soviet Russia embarked on a program which represents the latest mass movement toward an El Dorado. All of the characteristics of feverish energy and contagious enthusiasm that marked our own "new era" of

IT TOOK a long time for the depression to undermine America's buoyant optimism. Until recently the belief was well-nigh universal in this country that business would recover because it had always done so in the past. But now, with increasing frequency, we hear the comment that the present depression is "different," that "natural forces of recovery" cannot be relied upon to do their work. We are reminded that we no longer have a rapidly increasing population or a frontier begetting new communities, and that there are no great expanding industries to attract capital and to create work for the unemployed. We are told also that exports, which often helped lift us out of depression in the past, are showing no signs of growth but, on the contrary, are declining sharply.

Russia a Scene of Growth

If these observations are to the point, if indeed the present depression is different from its predecessors, there is good reason for America to turn its eyes toward Soviet Russia, where the forces of growth now absent in the remainder of the world are in full swing. Russian industry has undergone spectacular expansion. Russian demands for productive equipment have created a large outlet for the exports of leading industrial countries.

The importance of Russian growth to world economy as a whole has been emphasized by prominent European observers. Sir George Paish, well-known British economist, believes that Soviet Russia has replaced the United States as the major stimulus to international industry and trade. He says:

"Until the war, the expanding population of America through natural increase and through immigration was one of the great forces working for world prosperity. Now that the population of America is increasing more slowly in consequence both of the limited natural increase and of her immigration policy, it is highly desirable that some other country should develop rapidly. Inasmuch as European and Asiatic Russia has a greater area than any other nation and can support a far greater population than she now possesses, it is most desirable that everything shall be done that can be done to enable Russia to develop in the same way that America developed.

"No one can doubt that the growth of American prosperity over the past century contributed in no small degree to the increasing prosperity of the world. In the same manner no one can doubt that the growth of Russia in prosperity in the same way that America grew will bring very great advantages to the world."

In a similar vein, Sir A. Herbert, president of the Machine Tool Trades Association (British), stated:

"Russia is the only country in the world which is engaged on a wide scheme of industrialization, and consequently it is from Russia alone that large-scale orders for industrial plant are available. The importance of her orders can be gaged by the fact that for a considerable period she has taken 80 per cent of the total exports of British machine tools."

Varying Attitudes Toward Russia

In the past two years Western European exports to Russia have mounted while those from this country have sharply declined. Yet there is wide disagreement as to the desirability of Russian trade, even in Europe. Many leaders abroad are not enthusiastic about the financing of Soviet business, but justify it on the grounds that, as a means of relieving unemployment, it is preferable to direct Government subsidies to the idle.

Every discussion of Russia is surcharged with emotion and opinions on the attitude our country should take toward Soviet trade are as varied as the colors of the rainbow. On the one side we have fears of the subversive influence of communistic propaganda on our own institutions and distrust of the business integrity of the Soviet Government. On the other side, we find a disposition to discount reports of interna-

m Ponders As cs Industrial

By G. L. LACHER

lamented memory have been evident in the Russian pyatiletka. But, whereas our own effort to achieve a similar goal failed because we did not depart enough from individualistic traditions, the Russians have gone to the other extreme, severing all relations with the past.

To be sure, the Russians have a "plan." But "the best-laid schemes o' mice and men gang aft a-gley." Disregard for human nature, together with industrial inexperience and the waste that comes from haste and bureaucratic administration, may well lead to results unanticipated by the Soviet regime. The Russian experiment remains an experiment and our business relations with the Soviet Government should be in realistic accord with that fact.

tional political agitation and a belief that Russia, regardless of its form of government, is our natural friend and, therefore, worth cultivating as a means of promoting world peace. Russia has all the territory it needs and is concentrating its energies on internal development. Geographically, it is far removed from America and in no part of the globe do its interests seem likely to run counter to ours.

Is the Russian Experiment Feasible?

But entirely aside from considerations of propaganda, good faith or the international balance of power, there remains the question of the feasibility of the communistic experiment. Such a radical economic program, on such a large scale, cannot be appraised by consulting bare statistics, although statistics galore are available. The experiment, after all, is young. It has broken away from the roots of centuries of experience and tradition. It defies human nature, as we know it.

The point is made that Soviet Russia has "done things." It has built huge plants. It has created large State farms. It has collectivized millions of peasants. But none of these achievements has stood the test of time. The first five-year plan of industrial construction is just approaching completion, with by no means all of its objectives attained. Collectivization of the peasants was only begun in 1928.

Both in industry and in agriculture Soviet experimentation has attempted to submerge one of the strongest instincts of man—pride of individual ownership. It has likewise deprived the individual of the incentive of private profit, which has been the strongest motive force in building up modern industrial States.

The Driving Force in the Soviet Program

On the other hand, the Soviet program has given Russia a national aim, it has offered hope of a better future for all its citizens, it has created faith in that future and has galvanized the will of the country to achieve it. It has given the Russian people a supreme purpose—to create, within the communistic framework, an abundance of goods and services in which all will share. While it has not demonstrated that its social organization is capable of bringing about a surplus economy, it has outlined definite ways and means of achieving that end and those ways and means are being followed by most of the people. In a word, Russia is on the move toward a definite goal, whether for good or for ill.

In sharp contrast with Soviet Russia, the premier industrial nations of the world have proved that they can produce a surplus of goods but are perplexed and bewildered by the problem of distribution. Not having succeeded in coming to agreement as to ways of solving this problem, they evince a lack of purpose and will at the present time that belie their fundamental and inherent strength.

National enthusiasm, therefore, is for the time being at least a powerful, imponderable working in favor of the Russian experiment. While the Soviet scheme has encroached upon the individual's property rights and has virtually extinguished his opportunities for private profit, it has offered offsetting desiderata—pride of citizenship in a classless society, zeal bordering on religious fervor for an economic ideal that promises plenty for all and the abolition of poverty, interest in the wide panorama of knowledge as unfolded by education and industrialization, competition for the many new posts of responsibility and authority created by the Soviet program, and verve begotten by the fast tempo of change and progress which, wasteful though it may be, is carrying the country to a new destiny.

The power of an idea and the power of leadership, as exemplified in Russia today, have frequently set in motion mass movements which, for a time, have brooked no interference. It is only necessary to recall the spectacular rise of Islam, the sweeping invasions of the Mongols, and the

crusades, which drew men—and children—from all corners of Europe into marches on the Holy Land.

It is hazardous, therefore, to predict an early collapse of the Soviet system. Its vitality, its ability to withstand setbacks, may be greater than we, at this distance, can imagine. Modifications and adaptations in the interests of realism and a gradual retreat from the strict tenets of dogmatic communistic theory may prolong the patience of the Russian masses. After all, the Russian people have never enjoyed high living standards and, through wars and famine, they have become inured to adversity and hardship. Moreover, a younger generation has grown up which knows only the Soviet regime and has been constantly under the influence of organized communistic propaganda through the medium of school, press, radio and theater.

Economic as Distinguished from Political Aspects

Yet even the question of the permanence of the Soviet form of government is quite apart from the question of whether Russia is a good business risk. Soviet enthusiasm is boundless and Soviet publications read like the glowing prospectuses which became so familiar during our own late "new era." It is true that credit extended to Russia is used for productive purposes. But Russian industry has been created with feverish haste. From the standpoint of the time required to build up the productive powers of other countries it is a mushroom growth. Moreover, it has been built up with foreign brains. The Russians themselves have no real industrial experience and prior to the war had no industry which could be called indigenous. Such industry as existed was artificial. It had its inception at the time of Peter the Great, when industrialists from Western Europe were brought into the country. The bourgeoisie at the time of the Bolshevik revolution was not organically a part of Russia. It consisted largely of people of foreign origin or of people supported by foreign capital.

The building up of Russian industry under the Soviet regime represents a gigantic effort of the people as a whole. However, viewed from the standpoint of world economy, it constitutes a great waste of capital. There is now a large international surplus of plant capacity, and Soviet industrial construction will merely aggravate that condition. Before the war, Russia was the granary of Europe and exchanged its agricultural products for the factory products of other lands. Its foreign trade turnover was 40 per cent larger than that of the Soviet Union today, despite recent heavy imports of industrial equipment. If Soviet authorities had not diverted large numbers of peasants to industry and interfered with the affairs of those remaining on the land, it is possible that Russia would have long since resumed its ante-bellum position. Even if Russian agricultural production had depressed wheat prices to as low as 20c. a bushel, the peasants, as well as all other elements in Russia, would have had plenty to eat. And that is more than can be said today.

Sacrifices Build Up Resistance

Under the present regime Russia has rarely had a wheat surplus and at the present time is facing a serious food shortage. While this may not break down the morale of the nation, in view of the obvious enthusiasm of many elements, particularly the younger generation, it is becoming evident that the incessant drives and campaigns of the Soviet authorities to achieve their objectives represent an emotional strain, which in time must beget a reaction. The unremitting demands for sacrifices on the part of the people, and particularly on the part of the peasants, will inevitably build up overwhelming resistance unless the Soviet regime "comes through" with tangible recompense.

From the first there has been difficulty in collectivizing the peasants. In 1929 and 1930 the efforts of the Soviet Government to commandeer livestock for the collectives that were being formed, in many cases under virtual compulsion, resulted in a mass slaughter of animals. The number of cattle in the Soviet Union dropped from 71,000,000 in 1928 to 53,000,000 in 1930. The number of sheep and goats decreased from 146,000,000 to 113,000,000 and the number of pigs from 26,000,000 to 13,000,000. Livestock that was not slaughtered has suffered from lack of care and attention.

Opposition to collectivization has also affected crop yields. Recalcitrant peasants have sown the wrong kind of seed or, worse than that, have sown late. The last two harvests have been characterized by late sowing. This sabotage is traceable to the fact that the prices of agricultural produce are fixed at a low level by the Government, whereas the prices of industrial goods, also Government-fixed, are high. In many cases, industrial products cannot be bought at any price, owing to the constant shortage.

Russia Not Machine-Minded

Besides the difficulty of collectivizing the peasants, and especially the older generation, there is difficulty in introducing agricultural mechanization. The average American is mechanically minded, but the average Russian peasant, accustomed to the most primitive implements, has no conception of how to operate, repair or care for an agricultural machine.

Similarly Russia has had little experience with machinery in industry. There is a great lack of trained personnel for plant operation and management. Feverish efforts are being made to fill this void through the medium of training schools, but it is a grave question whether intensive instruction in a relatively short time can supply what other countries have acquired through generations of experience. There is no assurance, therefore, that Russia's brand new industrial plants can be operated efficiently.

Russia's industry, moreover, has been built at high cost. The five-year plan was begun during a period of high prices and, until the last year or two, the Soviet Government has been forced to buy under unfavorable credit terms.

The risk of extending credit to a high cost industry with a questionable management could not be other than great. And this risk has been accentuated by the fact that Russia has had an unfavorable balance of trade ever since the stock market panic. The excess of imports over exports in 1931, the last year for which complete figures are available, was 293,824,000 rubles.

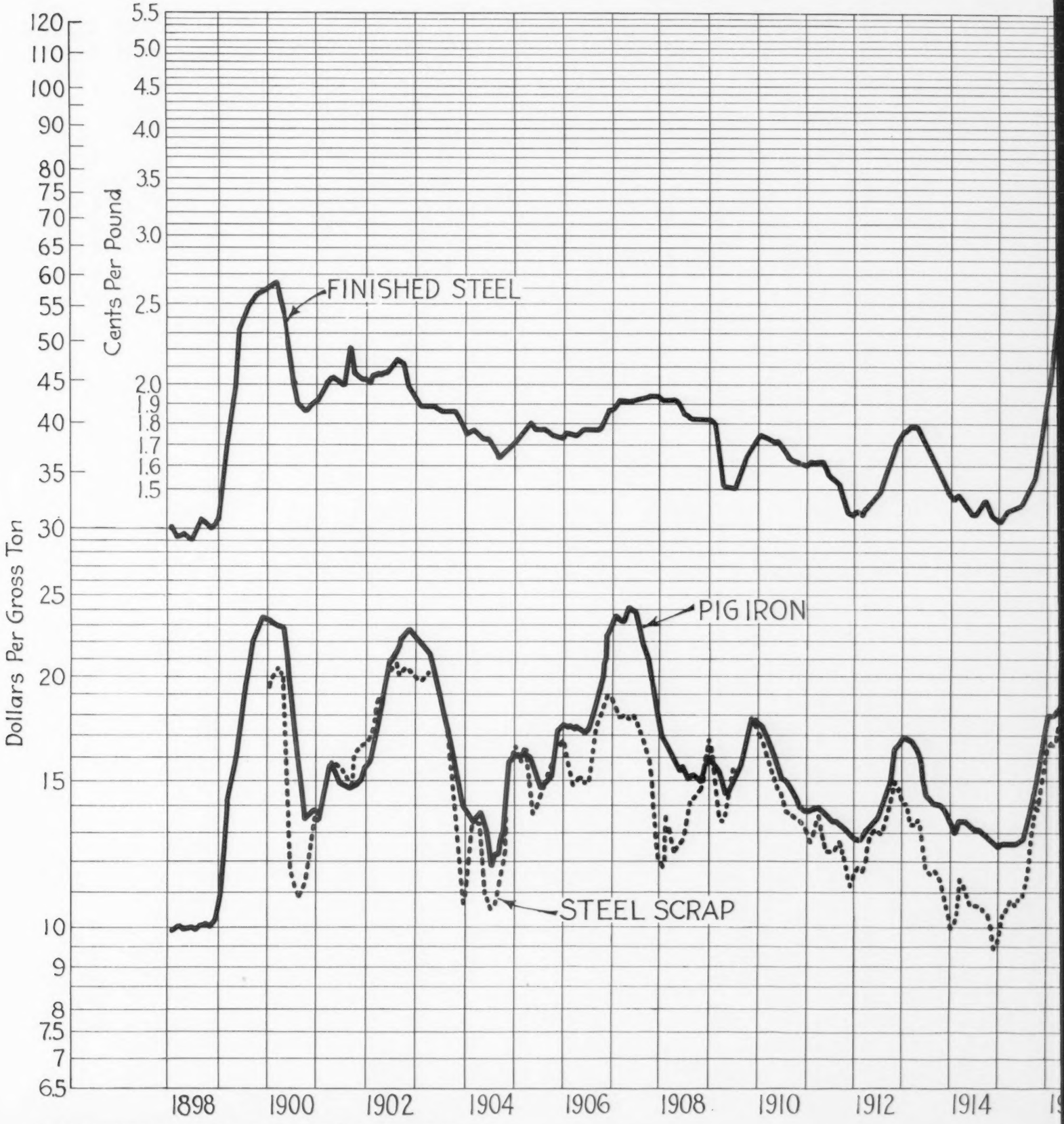
Russian Buying Power Limited

There are only three important ways in which Russia can pay for its imports: through exports, through gold production and through "Torgsin." Torgsin refers to a system of stores set up in Russia which distribute goods which are paid for in foreign currency or gold. In other words, a Russian abroad may buy goods for delivery to his relatives in Russia by sending gold or foreign currency to the Russian stores or to their branches in other countries. It is estimated that two years ago $50,000,000 in gold and foreign currency found its way to Russia through this channel. It is likely that the amount being transferred to Russia in this way is much less at the present time.

As to gold production in Russia, the last actual reported figure was that for 1927—809,987 fine ounces, or 25,194 kilograms ($16,743,000). Various statements have been published in Russia, however, on the basis of which 1931 production can be approximated. Several articles appeared stating that 1931 output did not equal that of 1913, when a little more than $40,000,000 worth of gold was produced. Then, on Feb. 28, 1932, the Moscow *Pravda* published percentage figures of production since 1927, stating that the output for 1931 was 210 per cent of that of 1927. Hence a computation makes the 1931 production 1,710,960 fine ounces, or 52,907 kilograms ($35,368,623).

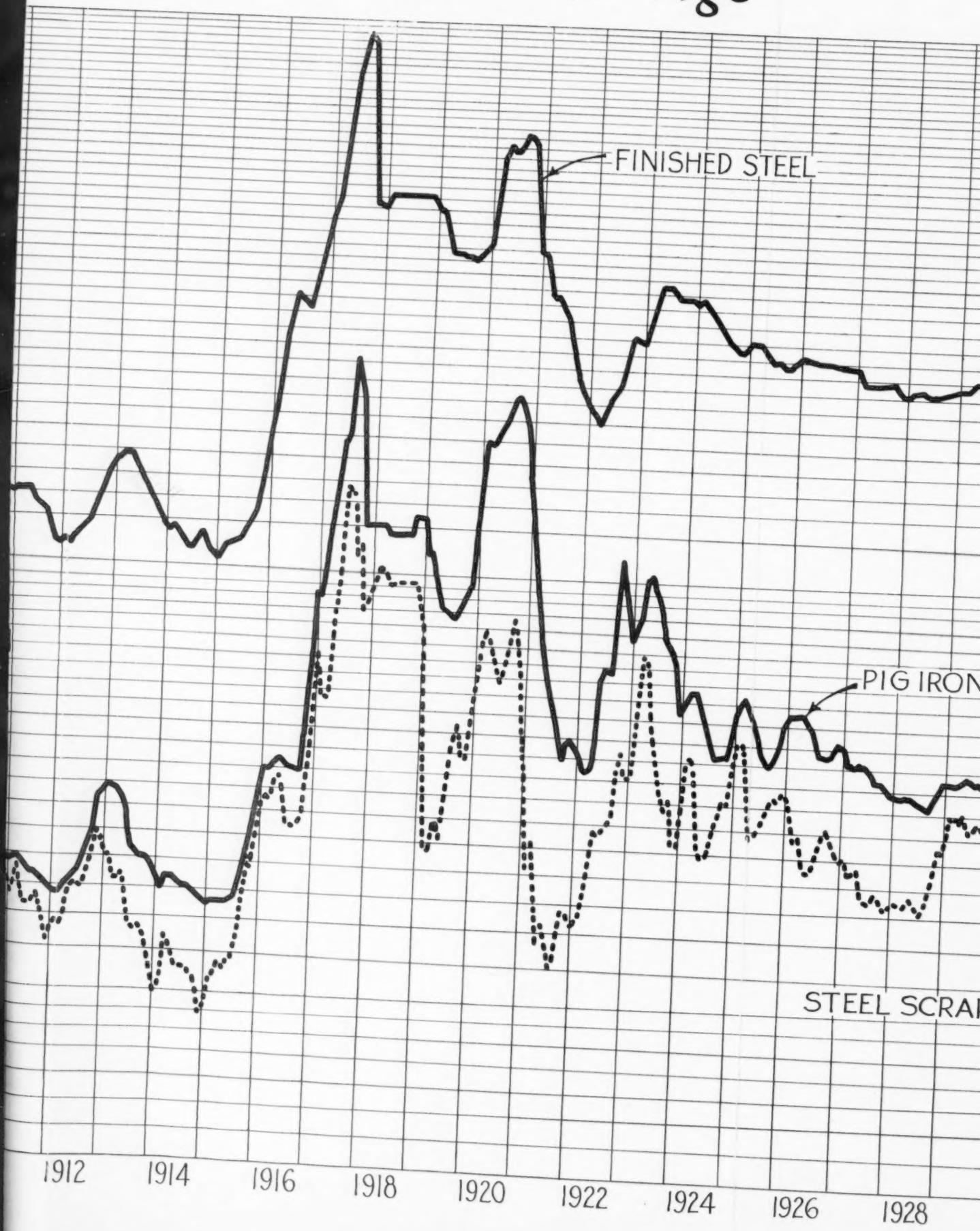
Gold production then is about $35,000,000 a year. Torgsin accourts for something less than $50,000,000 and the income from exports in recent years has been as follows: 1928—799,000,000 rubles; 1929—923,000,000 rubles; 1930—1,036,000,000 rubles; 1931—811,000,000 rubles. The average for the four years is 892,000,000 rubles. These export figures, however, may be exaggerated. While a large part of the exports from Rus-

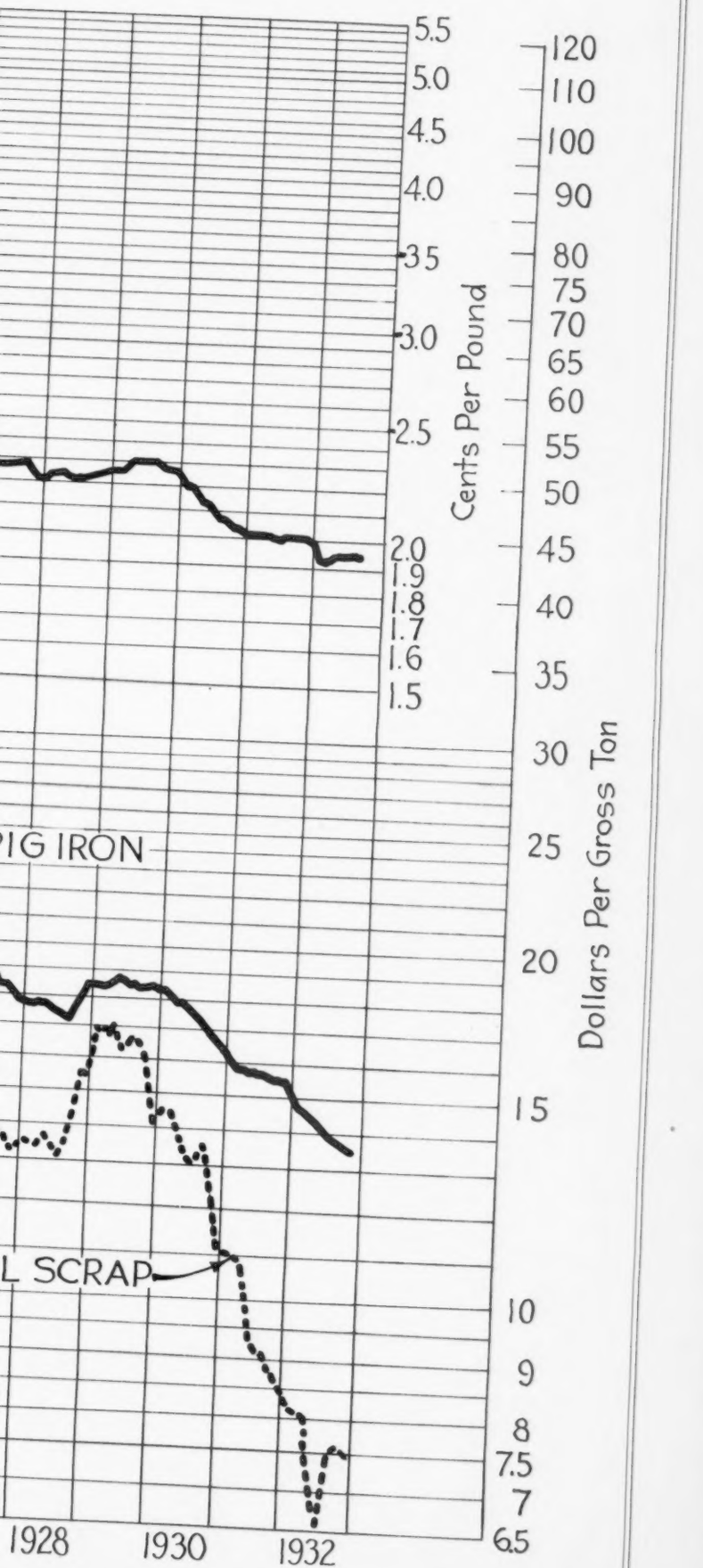
Composite Prices



Use of logarithmic or ratio ruling makes like vertical changes anywhere on the chart in a given interval of time represent identical percentage changes; thus, parallel slant lines anywhere on the chart represent like percentage changes.

te Prices of The Iron Age




5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.9
1.8
1.7
1.6
1.5
Cents Per Pound
120
110
100
90
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
9
8
7.5
7
6.5
Dollars Per Gross Ton
IG IRON
L SCRAP
1928
1930
1932

sia are shipped after being sold, considerable quantities of products are sent to traders and held abroad until sold. Hence it is believed that the export figures as reported by the Russian Government are, to an extent, estimates of the market value of unsold goods as they pass the frontiers. However, adding the average figure for exports, as reported, to gold production and Torgsin payments one obtains an annual total of about $540,000,000, which represents virtually all the resources that Russia has at its command to offset imports.

The chances are that the average for the next five years will not be greater. Virtually all governments have put restrictions on imports and, furthermore, the decline in commodity prices has hurt Russia relatively more than industrial countries because raw materials have gone down more than manufactured products. Besides, the internal position of Russia is such as to indicate smaller buying power. The shortage of food, as well as other commodities, seems to be steadily becoming more acute and hence it will be harder for the country to squeeze out a surplus of goods for export. To say, therefore, that Russia will have $540,000,000 to spend annually for the next five years is to be exceedingly optimistic. It is well to bear this in mind in connection with the Soviet Union's grandiose plans for its second pyatiletka.

Russia's outstanding business obligations are between $500,000,000 and $600,000,000. These are spread out, some of them extending over the next 32 months. Probably from $200,000,000 to $250,000,000 will fall due this year and in the succeeding year. It can be seen, therefore, that there is a definite limit to tne Russian market, from the standpoint of nations desiring to sell the Soviet Union.

Government Guarantees and Russian Trade

Government guarantees in Germany, Great Britain, Italy and the Scandinavian countries account for the sharp falling off in our trade with Russia in the past couple of years. These guarantees cover 60 to 75 per cent of the total value of goods sold to Russia. The length of the credit term ranges from 14 to 36 and even 54 months. The German Government has provided a guarantee of about one billion marks, or approximately $250,000,000. It is the fixed policy of the German Government not to increase its underwriting of exports beyond present limits, but to wait for maturity. In other words, the guarantee is used like a revolving fund.

Russian trade acceptances which are not covered by government guarantees are discounted at approximately the same rate the world over—30 to 40 per cent. In the case of guaranteed business the charges against Russian acceptances, including the fee to the government and the banker's discount, vary from 15 to 18 per cent.

The time-honored way of developing business in a debtor country is to extend long-term loans. A special representative of the Soviet Union is now in this country in the hope of obtaining a loan in case the United States recognizes his government. But early recognition is doubtful, and the floating of Russian loans in our country would be difficult in view of our unfortunate experience in foreign lending during the 20's. The basis of credit is confidence and confidence cannot be created so long as there remains doubt as to the feasibility of the Soviet experiment and so long as the obligations of former Russian Governments remain repudiated. Likewise there can be no restoration of confidence until the Soviet Government furnishes convincing evidence that it is no longer animated by fundamental hostility to capitalistic countries.

On numerous occasions Moscow spokesmen have attested to the willingness of the Soviet Government to settle the claims of Russia's creditors abroad on the following conditions: first, that credits be extended to Russia; and, second, that Soviet counterclaims be honored. These counterclaims grew out of military intervention in northern Russia and Siberia in 1918 to 1920, in which the United States participated. In 1919 William C. Bullitt, sent as a personal agent by President Wilson to Lenin, brought back an offer of the Soviets to assume responsibility for the financial obligations of previous Russian governments.

In 1923 the Soviet Government cabled President Coolidge, offering to enter negotiations for the settlement of the debt issue. Secretary of State Hughes replied that the United States would enter no negotiations until communistic propaganda in this country was discontinued.

Aside from considerations of propaganda the official view in this country, as influenced by a study of communistic doctrines, is that the Soviet Government, in carrying out its obligations, even its commercial obligations, is prompted by mere considerations of expediency.

Its willingness to pay, in other words, is under suspicion. In the case of certain private organizations, like the General Electric Co., the Soviet Government has paid extra interest on credits to amortize pre-war obligations. It proposed such a plan to the French and British but wanted such large credits in return that the French and British governments refused to consider the proposal. In the case of Great Britain, the Soviets wanted a large private loan, guaranteed by the Government. What is officially accepted as the real attitude of the present Russian regime is Stalin's statement on the debt question at the sixteenth congress of the All-Union Communist Party on June 27, 1930:

Continued on Advertising Page 38

A Survey of 420 Metal W

¶ The "Corner" Was Turned in September—

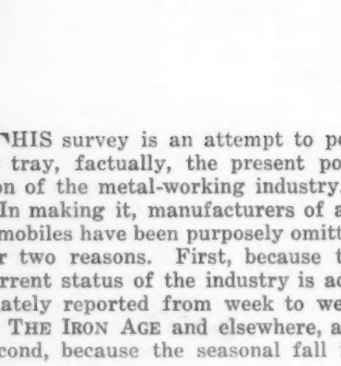
¶ December Volumes Averaged 21 Per Cent Over August—

¶ The Majority Expect Improvement During First Quarter of 1933—

¶ New Products Have Not Shown Expected Results—

THIS survey is an attempt to portray, factually, the present position of the metal-working industry.

In making it, manufacturers of automobiles have been purposely omitted for two reasons. First, because the current status of the industry is adequately reported from week to week in THE IRON AGE and elsewhere, and second, because the seasonal fall increase in automobile activity would overweight the results.



Above is shown the average volume fluctuations of all reporting companies as compared with the August base.

For similar reasons, producers of "standard" ferrous materials such as steel and pig iron have been omitted in large measure, although this survey embraces some of the producers of "specialty" materials.

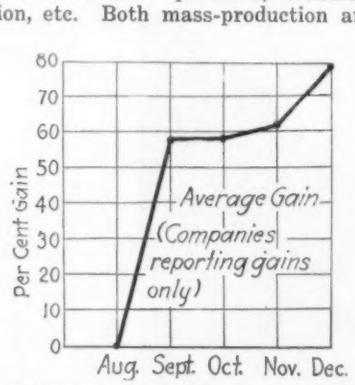
The picture, therefore, as given by the following data, may be said to be representative of the diversified consumers of steel and other basic materials, outside of the automobile industry. In view of the findings, this omission is particularly significant. It represents what has happened and is happening to the diversified metal consuming concerns which eventually represent the chief backlog of steel demand.

As to the adequacy of this survey. It embraces returns from 420 metal-working concerns, normally employing 204,542 wage earners, or approximately 10 per cent of the normal employment in the metal working industry, excluding the automobile makers. As such, it may be accepted as a typical cross-section.

The distribution includes small, medium and large size plants in the approximate ratio in which they would normally be found. For example, there are included:

175 plants normally employing less than 100 persons.
148 plants normally employing from 100 to 500.
27 plants normally employing between 500 and 1000.
27 plants normally employing more than 1000.

The variety of products represented in the survey covers almost every conceivable utilization of ferrous and non-ferrous metals in the building of capital equipment goods, metal consumer products, construction, etc. Both mass-production and jobbing or contract plants are well represented.



This chart shows the average gains over August of those companies only which reported gains. These were in a substantial majority.

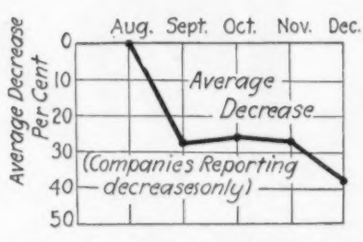
Dollar Volumes in Last Four Months

One of the interesting revelations of this survey is that relating to dollar volume fluctuations during the last four months.

September showed the largest percentage gain over August of any of these four months. Of 296 concerns reporting on this item, 178 showed increased business, 54 indicated decreases, while 64 reported no change. Averaging all reporting companies, the net average gain for September was 30.2 per cent increase in dollar volume over August. The average gain during that month for the 178 companies having increased business was 58.8 per cent. The average loss of volume for the 54 companies having decreased business in September was 27.7 per cent.

In October, the gains of September were well held, although there was a decrease in the number of concerns reporting increased business over August and an increase in the number reporting decreases under that month. The 294 concerns reporting dollar volume percentages for October over August showed a net average increase of 29.1 per cent., or a recession from September of 1.1 per cent. The 175 companies reporting increases in October over August averaged 58.2 per cent each, while the 64 reporting decreases showed an average loss of 25.4 per cent each. Fifty-five reported no change in October from August.

November, for the 293 reporting companies showed an average dollar volume 24.6 per cent greater than that of August, or a recession of 4.5



This chart shows the decreases in volume, since August, of the minority reporting losses in sales volume.

al Working Plants Shows That:

¶ Average Distribution Cost is 26.6 Per Cent—

¶ The Industry Now Pays an "Invisible" 5 Per Cent Sales Tax—

¶ The Majority of Employers Favor Shorter Working Hours—

¶ Distribution Is in for an Overhauling—

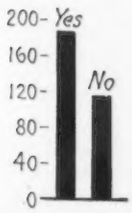
per cent from the October average. The 151 concerns reporting increased business showed an average increase, however, in November over August of 62.0 per cent, while the 79 reporting decreases averaged a dollar volume loss of 27.5 per cent. Sixty-three concerns reported no change from August.

December data was partly an estimate, due to the closing of the returns of this survey on Dec. 15th. The 259 companies reporting estimates of December volume showed an average of 21.3 per cent increase over the base month of August. One hundred and nine companies estimated increased volume, the average being 79.7 per cent over August. Eighty-one companies indicated an expectation of volumes less than August, averaging 39 per cent. Companies expecting no change from August in December numbered 69.

The results of the survey indicate that August was the low point of dollar volumes for the majority of these companies, that the substantial September gain was well held in October but slipped off in November and December, partly due to seasonal and partly to political influences. It also shows accumulative monthly gains, except in October for the past four months for the larger part of the reporting companies.

Expectations for First Quarter of 1933

Projecting the average of opinion as to dollar volumes forward over the coming first quarter of 1933, 184 companies expect an increase and 117 do not.



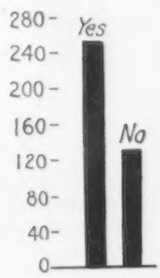
Do you expect increase in volume during first quarter of 1933?

Two hundred and eighteen companies expect that their business recovery will be retarded to some extent by political uncertainties during the present quarter year, while 152 express the opinion that politics will not affect their businesses.

New Products as Trade Stimulators

The development and marketing of new products has apparently not afforded the stimulation to volume that some have expected, although it is quite possible that curtailed promotion and advertising have handicaped their possibilities.

Of 384 reporting companies, 254 placed new products on the market during 1932, while 130 did not. In the cases of 113 concerns offering new products, an increase in sales volume resulted, while in the cases of 150 also offering new products, it did not. In addition, 3 companies report a "slight" stimulation.



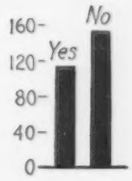
Did you bring out new products during 1932?

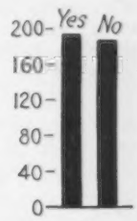
In spite of these somewhat disappointing results, a majority, it seems, will continue during 1933 to push new products for the purpose of gaining business. For of 376 companies reporting on this point, 193 indicate that they intend to bring out new products during 1933, whereas 183 do not.

Market Surveys as Aids to Merchandising

In view of the drastic changes in purchasing power, a majority, it would seem, are inclined to doubt the value of past statistics in determining their market potentialities. Of a total of 370 reporting on this subject, 212 do not consider pre-depression statistics of any considerable value to them, whereas 158 say that they do.

Did the new products stimulate your sales?





Will you bring out new products in 1933?

On the other hand, whereas 139, acting upon this belief, are undertaking new market surveys intended to reflect present conditions, a still greater number, 237, are not. This would indicate either a belief in waiting until conditions become more stabilized before beginning such survey work, or more probably, a natural inertia in undertaking it.

Cost of Distribution

Cost of distribution, in the metalworking industry, in terms of its percentage of cost of production (factory cost) varies from a high of 200 per cent to a low of one per cent. In the latter case, the factory product is disposed of under contract, to a few automobile manufacturers.

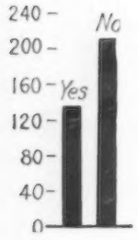
The average cost of distribution, for the 299 concerns reporting upon this item, is 26.6 per cent. Of 371 reporting companies, only 80 are of the

opinion that their distribution costs will increase during 1933. A large majority, namely 291, believe that they will not increase, or will decrease.

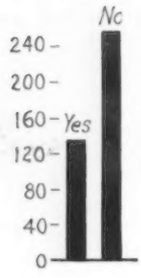
A further analysis of the cost of distribution, in terms of groups of related products and also of groups of plants of various size, will appear in a subsequent issue of THE IRON AGE, in connection with a further breakdown of numerous other items in this survey.

Breakdown of Distribution Costs

That great attention is being paid to the subject of distribution is indicated in the answers to the following question: "Are you setting up, or have you set up, methods for analyzing distribution costs as adequately as you have been analyzing, or breaking down production costs?"



Do you consider past statistics of any considerable value in determining market potentialities?



Are you making new market surveys?

Of a total of 370 answering this question, 223 reply in the affirmative and 147 in the negative. This is a very significant result, since it has in the past been the exceptional concern that has properly sought or found the details of its distribution costs.

In the pursuit of such an analysis, there are two main avenues of approach. One is through the study of market areas and the other through the study of product lines. Of 171 concerns which are now undertaking distribution cost analysis, 43 are confining their approach to market areas, 39 to product lines, and 89 are tackling the problem from both directions.

Production Improvements Will Continue in 1933

Despite the increased interest being shown in distribution, our survey indicates that production improvements will be sought for in 1933 by a majority of concerns in the metal-working field. This is evident from the distribution of replies to the question: "During the present year, do you expect to concentrate major effort toward improvements in distribution, or production, or both?"

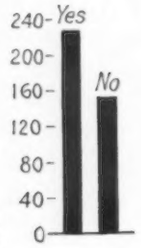
Of the 341 companies replying to this question, 159 will concentrate upon distribution improvement, 73 will apply major effort toward production improvement, while 109 will divide their energies on both.

How the Industry Regards the Tariff

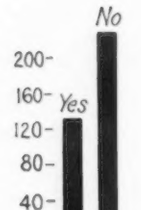
Economic and political problems affecting the industry, such as tariff revision, modification of the anti-trust laws and the effect of foreign price competition are reflected in the replies to our questionnaire.

A considerable majority, 224 companies, favor no change in the present tariff. Of the minority of 128 who do, 77 would like to see certain upward revisions while 51 believe they would be benefited by certain reductions.

Of 349 reporting companies, 197 would like to see some amendment of the "Sherman" and other "restraint of trade" laws, while 152 express themselves as believing that they should be let alone.



Do you favor adjustments in the tariff?



Are you breaking down sales costs just as you do production costs?

So far as foreign price competition is concerned, of 373 companies, 80 are feeling a pressure to their disadvantage, while 293 report that they are not being affected by it.

That the metal working industry is already paying approximately a 5 per cent "invisible" sales tax is revealed by the replies to our question: "Can you state what approximately is your present total tax burden, State, Federal and local, per unit of $1000 of sales?"

The total number of replies to this question was 236. The highest tax reported was $684 per $1000 of sales, representing, of course, the penalty imposed by government on decreased volume in an extreme case. One hundred and seventy-seven companies report tax payments averaging less than $50.00 per $1000 of sales, 36 report a tax rate of from $50.00 to $100.00 and 23 report tax rates exceeding $100.00 per $1000 of sales.

The average tax rate for all reporting companies was $47.62.

This is a considerable increase as contrasted with conditions in 1913. The 109 companies whose records enabled them to give figures for 1913 reported an average of $13.39 per $1000 of sales. Taking into account the difference in the values of the 1913 and the 1932 dollars, the increase in tax in the metal working industry has been 278 per cent.

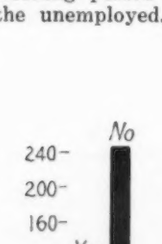
Technological Displacement

The metal-working industry may be said to represent an extreme case of mechanization as compared with other industries and pursuits. It is interesting therefore to get the experience of the machinery users in this industry with respect to technological displacement *in their own companies.*

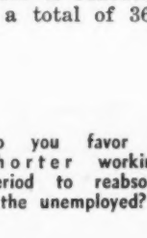
Of a total of 356 reporting on this question, 244 companies state that technological advance has not been a serious factor in causing unemployment as indicated in their own experience. On the other hand, a minority of 112 reply that it has.

Shorter Hours in Industry

Quite surprising is the apparent unanimity expressed by the management of the reporting companies with regard to the need of reducing the working period in order to reabsorb the unemployed. Of a total of 360 companies expressing themselves on this point, 282 believe that our general industrial policy should be toward shorter hours. Only 78 report the contrary opinion.



Does your own experience indicate that mechanization creates unemployment?



Do you favor a shorter working period to reabsorb the unemployed?

* * *

(A further and more detailed analysis of a number of subjects covered by this survey will appear in a forthcoming issue of THE IRON AGE.)

New Year Opens in Midst of Major Debt Adjustments

By DR. LIONEL D. EDIE

OUR heavy domestic debt burden, according to the author, cannot be successfully lightened by currency inflation or devaluation of the dollar. The debt problem can best be solved, he believes, by expediting individual debt adjustments, by reducing governmental expenditures and balancing governmental budgets, and by exerting upward pressure on the price level.

Beneficial effects on prices can be obtained, in his opinion, (1) by continuing a condition of easy money, with surplus member bank reserves and excess bank credit ready for utilization, (2) by international collaboration to stabilize the pound and to employ the credit factor to stiffen world commodity markets, (3) by devising a plan to restrict American agricultural production and to work off agricultural surpluses.

▼▼▼

"THE excess burden of debt" has become almost a household phrase in the United States. But excess implies a standard or normal, a base, of debt which would be just enough. Strangely enough, almost no one has bothered to *measure the excess*, or to set up a yardstick of that amount of debt which can be conveniently carried by the United States. Yet abstract generalizations on such a subject are of little value. They give false alarm to some people and false complacency to others.

The present analysis will seek to apply a measuring stick to the debt burden and thereby to aid in seeing the problem in a proper perspective.

The two accompanying tables give debt estimates at four successive dates, beginning with 1913. They, therefore, afford a pre-war and post-war comparison. The classifications are broad enough to reduce the story to its simplest elements. The first table gives estimates of long-term debt; the second, of short-term debt.

Many of the figures are estimates rather than actual recorded data. Other authorities, who have checked these estimates carefully, advise that my calculations, if in error, are too high rather than too low. Errors, however, probably affect the final total debt figures by less than 10 per cent.

General Interpretations

The data may first be interpreted in a general way by the following comments:

(a) The total debt burden of the United States is not in excess of 180 billion dollars.

(b) This is an increase from the pre-war figure, which was 55 billion dollars.

(c) About half of this increase came before 1921, about half after 1921.

(d) Debt about tripled between 1913 and 1929, population increased about one-third, the normal production of the country about doubled, and the price level at the end of the period was more than 50 per cent above that at the beginning.

(e) If debt in 1913 be arbitrarily assumed to have been in balance with the productivity of the country, and if the 1913 price level be adopted as the level upon which debt is to be paid off, then the excess of debt in 1929 may be placed roughly at 60 billion dollars.

(f) It follows that a debt burden suitable to the changed conditions, i.e., a burden which the country could conveniently carry, would be in the neighborhood of 120 billion dollars.

(g) On this premise, the problem of debt adjustment is to scale down the 1929 debt burden by about one-third.

Changing Ideas About Bad and Good Forms of Debt

In 1928 and 1929, it was fashionable for critics to point to brokers' loans and instalment paper as the most dangerous forms of debt. Solemn warnings were issued that these two forms of debt would bring terrific loss.

As a matter of fact, both were prompt to liquidate and the defaults and bankruptcies among firms extending these forms of debt have been surprisingly small. "Brokers' loans for others" were paid off with very small losses and bankers' loans to brokers proved to be better assets than did most other forms of bank loans and investments.

Had any one been able in 1929 to visualize a drop of 85 to 90 per cent in stock values, he would have visualized the collapse of all New York City banks. But the drop did come and the punishment was absorbed. The anticipation was worse than the reality. This lesson is to be kept in mind in viewing debt problems remaining.

The instalment paper came through the depression in remarkably good shape. Banks found loans against instalment paper better loans than most of their time-honored forms of loans and better than their bond portfolios. Thus was another bogey laid to rest.

Probably 9 billion dollars of brokers' loans and instalment credits have been liquidated since 1929 and liquidated not by default but by being paid off. No other class of debt can show such a record. Yet this was the class about which people wagged their heads in 1929. So it is that notions of good and bad debts change. Perhaps some of our 1933 notions will change just as radically.

Some Observations on the Short-Term Debt

1. The short-term debt is less than a quarter of the total debt.
2. Nevertheless, it has a unique importance in that it is chiefly debt to banks and bank debt is closely tied in with the movements of the price level.
3. The deflation of commodity prices has been a function of the liquidation of bank credit. Further shrinkage of bank credit would probably be accompanied by further decline of the price level.
4. Further reduction of short-term bank debt would have no corrective value and would probably invite renewed crisis. Whatever debt readjustment is to be done should be accomplished without destroying the existing structure of bank credit.
5. Most forms of short-term debt have already undergone drastic readjustment. It is principally long-term debt which remains unadjusted. *The great*

problem of the debt burden in 1933 relates to the long-term debt.

Two Groups of Long-Term Debt Account for Bulk of the Increase

Turning, therefore, to the long-term debt for further interpretation we find the bulk of the increase since 1913 accounted for by two main groups, namely, *public debt and urban real estate debt:*

Increment in Long-Term Debt, 1913 to 1932	
(a) Public debt alone....	$33,460,000,000
(b) Urban real estate alone	26,825,000,000
(a) and (b) combined....	59,285,000,000
All others.....	35,290,000,000
Grand total increase, all forms.	$95,575,000,000

As the table shows, nearly two-thirds of the entire increase in long-term debt is traceable to public debt and urban real estate debt. This observation begins to isolate the debt bacillus.

Public debt has increased nearly eight times and urban real estate debt more than four times since 1913. A large part of the excess burden of debt is right here.

Readjustments in Public Debt

Public debt, instead of having been readjusted during the depression, has actually increased further by about five billion dollars.

We have delayed a real attack on this burden of public debt, but we cannot delay much longer. The first point of attack is to balance national, State, and local budgets, mainly by means of drastic economies. The great battle on this issue remains to be fought out. Municipal defaults here and there have appeared and some of our largest cities have already had fiscal crises. But the struggle for sound fiscal policy has only begun.

We have finished an era of governmental extravagance and we must now strive for an era of public economy and of public debt reduction.

Readjustment in Urban Real Estate Debt

Part of the increase in this group is due to the remarkable rise of urban population. Since the pre-war period, the population of the United States has increased by about 30,000,000 people and the entire increase has occurred in cities.

But the larger part of the increase in real estate debt has been due to speculative rise in land values, to excessive building costs, and to speculative over-building.

Probably 10 per cent or thereabouts of real estate obligations have already gone through the wringer, another 10 per cent is now in process, and perhaps another 10 to 20 per cent will have to go, although this is a matter where opinions may differ sharply. The most hopeful comment that can be made is that perhaps the worst will be over by the middle of 1933. The process is painful, but there appears to be no escape from a great deal of reorganization and scaling down of individual situations in this real estate field.

Agriculture versus Railroads and Utilities

The debt of agriculture, railroads and utilities combined is less than that of urban real estate alone.

Contrary to general impressions, the debt of farmers, railroads and public utility *operating* companies did not undergo wild expansion in the new era period. Farm debt reached its peak about 1925, railroad debt increased only about 10 per cent from 1921 to 1929, and *operating* companies of public utilities increased their debt about in proportion to the growth of the industry.

Public utility *holding* companies had a sharp increase of indebtedness, but a large part of this has already entered the process of liquidation.

The farm debt problem differs sharply from that of railroads and utility operating companies. Farm debtors suffer primarily from a drop in prices, not merely to the pre-war level *but to nearly* 50 *per cent below the pre-war level. Volume*, on the other hand, has remained relatively constant. Railroad debtors, on the other hand, suffer from a violent decline in *volume*, while their price factor, the rate structure, has been held up far *above* the pre-war level. Utility operating companies have enjoyed not only a maintained rate structure but also a remarkable relative stability in *volume.*

Concluded on Advertising Page 42

DEBT OUTSTANDING IN THE UNITED STATES

Long-Term Debt)

(Millions of Dollars)

	1913		1921		1929		1932 (Beginning of Year)	
Federal government.....	1,028		23,155		16,301		18,600	
State, county, municipal.....	3,820		8,688		17,100		19,700	
Total government.....		4,848		31,843		33,401		38,300
Steam railroads.....	10,842		11,357		12,459		13,081	
Street railways.....	1,600		2,300		2,200		2,000	
Public utilities.....	2,124		4,152		9,569		10,411	
Total utilities.....		14,566		17,809		24,228		25,491
Industrial		3,600		8,300		15,631		16,600
Unclassified		555		1,950		3,950		4,700
Total corporate.....		23,569		59,902		77,210		85,091
Farm mortgage.....	4,900		8,232		9,500		9,400	
Urban real estate (including real estate bonds).....	8,800		15,120		33,125		35,625	
Total mortgage.....		13,700		23,352		42,625		45,025
Federal land banks.....	....		420		1,181		1,184	
Joint stock land banks.....	....		77		577		544	
Total quasi-public.....		....		497		1,758		1,728
Grand total, long-term debt....		37,269		83,751		121,593		131,844

Chief Features of Last Year's Progress in Some Metallurgical Fields

By EDWIN F. CONE

IN a year of acute business depression, such as that of the year just passed, it would not be surprising if there had been a curtailment in metallurgical research and progress in proportion to that in manufacturing operations. Had that been so there would be very little to record as to definite advances in metallurgy and heat treatment last year. It is a gratifying fact that during 1932 there was very little abatement in the activities of research organizations. It is true that many of the results of this work have not been made public, some of them awaiting more favorable conditions. But further progress in problems already in hand the past year or two, and definite steps to meet new conditions were the fruits of last year's work.

It is the object of this article to review and interpret briefly some of the main and significant features of the progress during 1932 in blast furnace, open-hearth, electric and other melting operations, in heat-treating, in new metallurgical processes and in other allied fields, exclusive of materials. The facts and opinions presented are based on published articles in THE IRON AGE, on the views of leading authorities in certain fields, and on other sources.

SOME high lights last year in metallurgical methods, heat treating, testing and other fields:

- **Slow blowing of blast furnaces.**
- **Open-hearth steel of greater uniformity and higher quality.**
- **Electric melting of gray iron.**
- **Progress in atmospheric control of heat-treating furnaces.**
- **Nitrided cast iron.**
- **More knowledge of fatigue of metals.**
- **Advances in magnetic testing.**
- **Alloy gray iron.**
- **Beryllium, selenium and other rare metals.**

▼ ▼ ▼

Blast Furnaces

IN blast furnaces, progress last year was in reverse instead of high speed, says an authority in this field. The year was one of shut-down or slow blowing tactics, with much thought on the part of executives devoted to the rationing of hours of work and of power—the rations being short in both cases. There has been no occasion for the perfection of new processes or new capacity.

Some remarkable things have been accomplished along the lines of slow blowing and intermittent blowing, says another authority. One operator has been able to run his blast furnace for one 8-hr. turn only, during the day time. During the other two turns he operated with very greatly reduced blast pressure so that he might have enough gas with which to generate power for auxiliary services. This particular furnace was operating on 100 per cent sintered magnetic concentrates and the operation was very smooth and regular. The furnace picked up each day and the results were very striking. Similar operations have been successfully carried out at many of the blast furnaces of the country.

The effects of using scrap steel in blast furnaces are known and appreciated by some operators but not by all, says the same authority. It constitutes the cheapest raw material. Results obtained from using scrap by some blast furnace people, particularly in the South, are striking and very interesting. Tonnage output can be readily increased, the heating value of the gas from the top of the furnace is distinctly higher and scaffolding is reduced. Along these other lines the teachings of the depression will be of great value to operators for many years.

Open-Hearth Melting

IN open-hearth melting during 1932, recognition must be accorded the advances made in the manufacture of clean or high quality steel. The program initiated by the metallurgical advisory board of the Carnegie Institute of Technology at Pittsburgh about five years ago, was further pursued last year with gratifying results, under the leadership and direction of Dr. C. H. Herty, Jr.

As is well known, the chief factor in this work has been the use of special manganese-silicon alloys. According to Dr. Herty the chief feature of this work is the fact that steel made with these alloys is quite uniform in quality, that their use saves furnace time and is less expensive than when using silicon pig iron and ferromanganese. It is, of course, necessary to watch the slags carefully so that the work done in deoxidation is not ruined by too rapid return of iron oxide from the slag. It has been found that in most plants the practice has been easy to apply under operating conditions. Perhaps the most outstanding feature of these deoxidizers is that they were developed from fundamental work on slags (deoxidation products) and on rates of reaction rather than by "cut and try" methods.

Control of Iron Oxide

Aside from this, a great deal of work has been and is being done on the effect and control of iron oxide in open-hearth slags. A great deal of experimental work has been going on in various plants, but only one paper has been presented on this subject—the one by W. J. Reagan before the American Institute of Mining and Metallurgical Engineers at the annual convention in February.

The foregoing and other results of the metallurgical research work of the advisory board were ably presented by the various leading workers at the regular open meeting at Pittsburgh last October (THE IRON AGE, Nov. 3, page 695). These meetings are a landmark each year in recording metallurgical progress in open-hearth melting, in rustless steel and other problems.

Two articles which discuss certain phases of open-hearth practice, appeared in THE IRON AGE for Aug. 18 and 25 by Lewis B. Lindemuth, New York. One discussed "Basic Open-Hearth Furnace Charges" and the other "Using More Scrap in Steel Melting." The articles were regarded

as highly valuable contributions to the literature of steel making.

In the first the author offers a tabulation of relations between the amounts of pig iron to go with different amounts of different grades of scrap established on the record of many heats. In the other the author contends that a better understanding of the use of scrap will result in its entering in an increasing ratio in the steel-making process and work thus toward better conservation of ore resources.

Refractories for Melting Furnaces

The depression has not interfered with intensive laboratory research programs in the development of new refractories or in improving the properties of existing ones. According to a large manufacturer, a survey has been made of the relative capacity of unburned magnesite brick and fireclay brick to absorb and give up heat when used as regenerator checker brick. It is stated that it has been found that the unburned magnesite brick will take up and give out approximately 40 per cent more heat than standard fireclay checker brick. The unburned magnesite brick is quite resistant to spalling and slag corrosion, caused by the dust which is carried with the outgoing furnace gases, so that its use in open-hearth checkers may be quite advantageous. Preliminary commercial trials are claimed to confirm the laboratory findings.

For quick repairs to open-hearth furnace bottoms "Quick Set Magnesite" containing approximately 20 per cent lime is reported as finding more general application. Silica brick in certain parts of open-hearth furnaces continue to be displaced by unburned magnesite brick because of the longer life claimed to be obtained.

Another company has introduced a brick under the name of Ritex with the object of providing a material which will extend the intervals between repairs to open-hearth furnaces by replacing silica brick in the exposed sections of front walls. These new bricks are described as chemically bonded, hydraulically pressed unburned magnesite bricks.

A larger use of high alumina brick containing 50, 60, 70 and 80 per cent alumina is reported by another company. These bricks have properties which are claimed to better fit them to meet specific requirements as in the well wall and top checker courses in blast furnace stoves, the top checker courses and water-cooled parts in open-hearth furnaces.

Still another company has developed a new type of refractory for electric furnaces known as Tercod. This new material is described as having an exceptionally low coefficient of thermal expansion. Its resistance to spalling is large and it is offered as an ideal material for electric furnace roof and door locations.

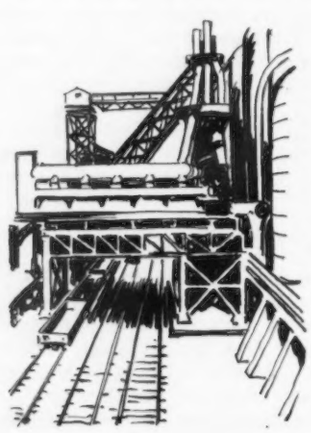
These developments in refractories all tend toward more effective operation of open-hearth and other furnaces and toward lower cost steel.

Electric and Other Melting

QUIET progress has been made in the electric furnace field. Undoubtedly a major development has been the installation of so-called bleeder type furnaces for the purpose of keeping down the power company demand charge. Although this is not a new development, because one of the first ones of this type was installed in 1917, the greater interest in it the past year has been due to the depression. By installing a small furnace (bleeder) alongside of the larger one normally used, and working the smaller unit from the substation of the larger furnace, it is possible to cut down the power demand, and thereby the power demand charge, which results in considerable saving in the monthly power bill, varying with the type of rate in force.

When the history of the electric furnace in 1932 is written in full retrospect, it will be recorded that there was an expanding increase in interest in the application of the electric furnace to the gray iron industry. An authority states that this is "a continuation of a gradual improvement in the quality of gray iron demanded in various trades over a period of years. Each succeeding year has shown an increasing percentage of total furnace sales in the gray iron field." This is true of several types of furnaces. The first installation for gray iron castings is claimed to have been made by the Pittsburgh Lectromelt Furnace Corpn. in 1919.

There has been increasing interest in the top charge design of electric furnaces developed by the Pittsburgh company, the first one having been installed at the plant of the Bethlehem Steel Co. in 1925. This type permits of rotating the furnace roof and superstructure out over the ladle pit, clearing the furnace crucible and permitting not only the placing of the charge in the furnace from a single drop bottom bucket but the loading of much bulkier scrap into the furnace, filling it much fuller. Operating records over a period of years show a better roof life, it is claimed, and also a lower kilowatt hour consumption because the time interval between heats is reduced to at least half and in many cases to one-fifth normal time. There are other furnaces on the market using this principle.



The practice of making occasional gray iron heats for jobbing castings in steel foundry electric furnaces has been further developed. Due to the reduced demand for both steel and iron castings, it has been possible in several plants to increase business by this procedure. While this practice is not new, it is new to the American trade.

Remelting Rustless Steel

"There has been marked improvement in the operation of arc furnaces in the remelting of low-carbon stainless steel scrap to the point that 100 per cent charge of 0.06 per cent carbon rustless steel scrap in being remelted with the maximum pick-up of 1 per cent carbon and with no chrome loss," says W. B. Wallis, president Pittsburgh Lectromelt Furnace Corpn. This is an important development which, together with the use of the high-frequency furnace in this field, has greatly aided in solving this difficult problem.

An outstanding feature of electric melting developments in 1932 has been the greater use of the high-frequency melting furnace. The installation and operation of a 4-ton unit of this type by the leading steel company was a feature. A continued interest in and expansion in the use of other types of electric melting furnaces for steel, iron and non-ferrous metals was noted last year.

A Hollow Electrode Furnace

A startling innovation in electric reduction of iron ores was described in THE IRON AGE, May 12. It is the Wiles hollow electrode furnace. By this process it is claimed that finely ground ore, mixed with fluxes, can be passed through the electrodes with the result that steel of high quality is easily produced. It is stated that alloys can be added to the ore mixture so that high quality alloy steels result.

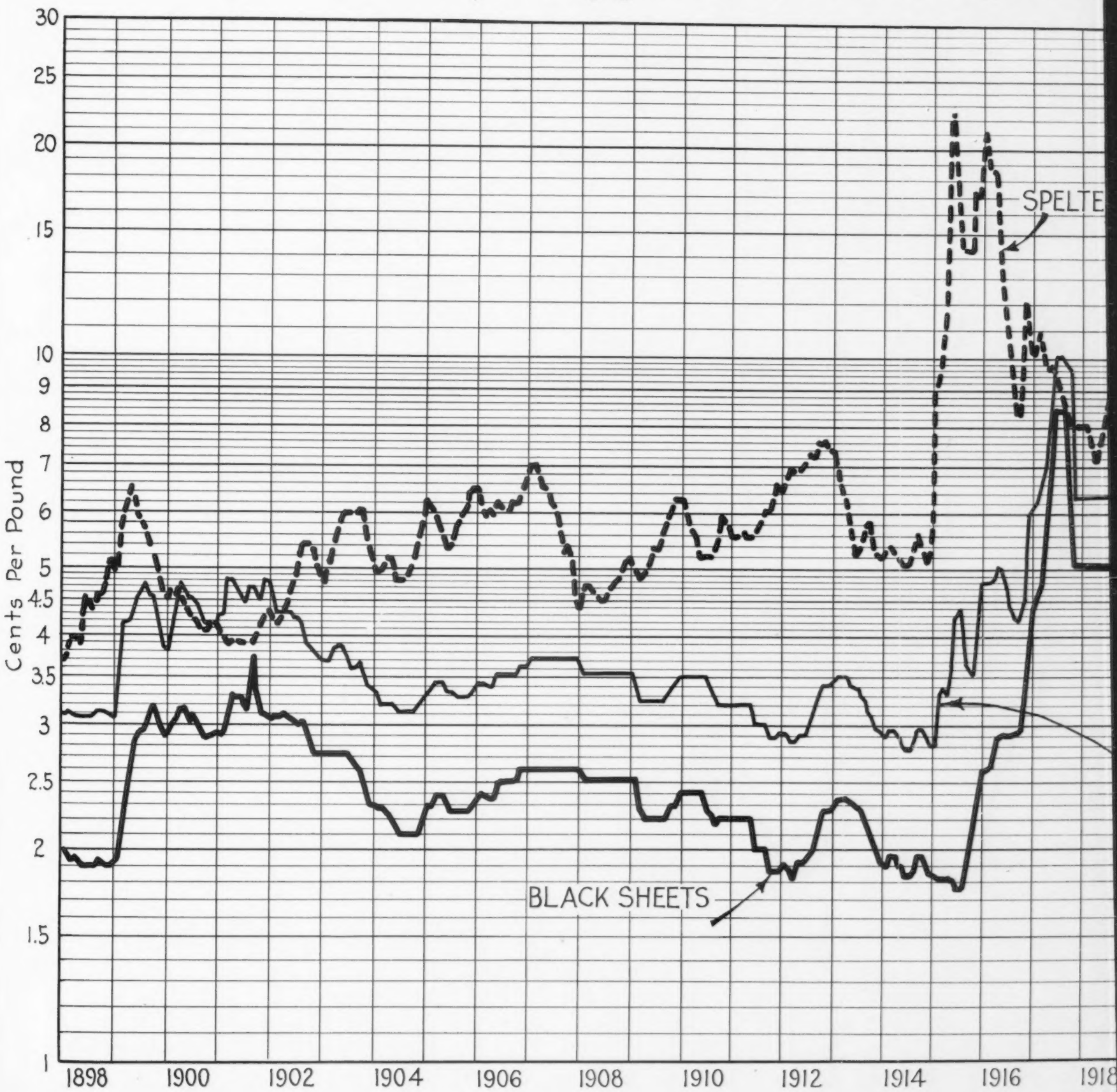
Duplexing with the cupola and the electric furnace has made further progress, despite the fact that economic conditions have held back large scale melting, a condition most favorable to duplexing. There are cases, however, where during the last year duplexing has increased the production on an average of five to one in tonnage with superior iron as a product. When conditions become more normal, it is certain that this melting procedure will gain wider application.

Ferroalloy Briquets

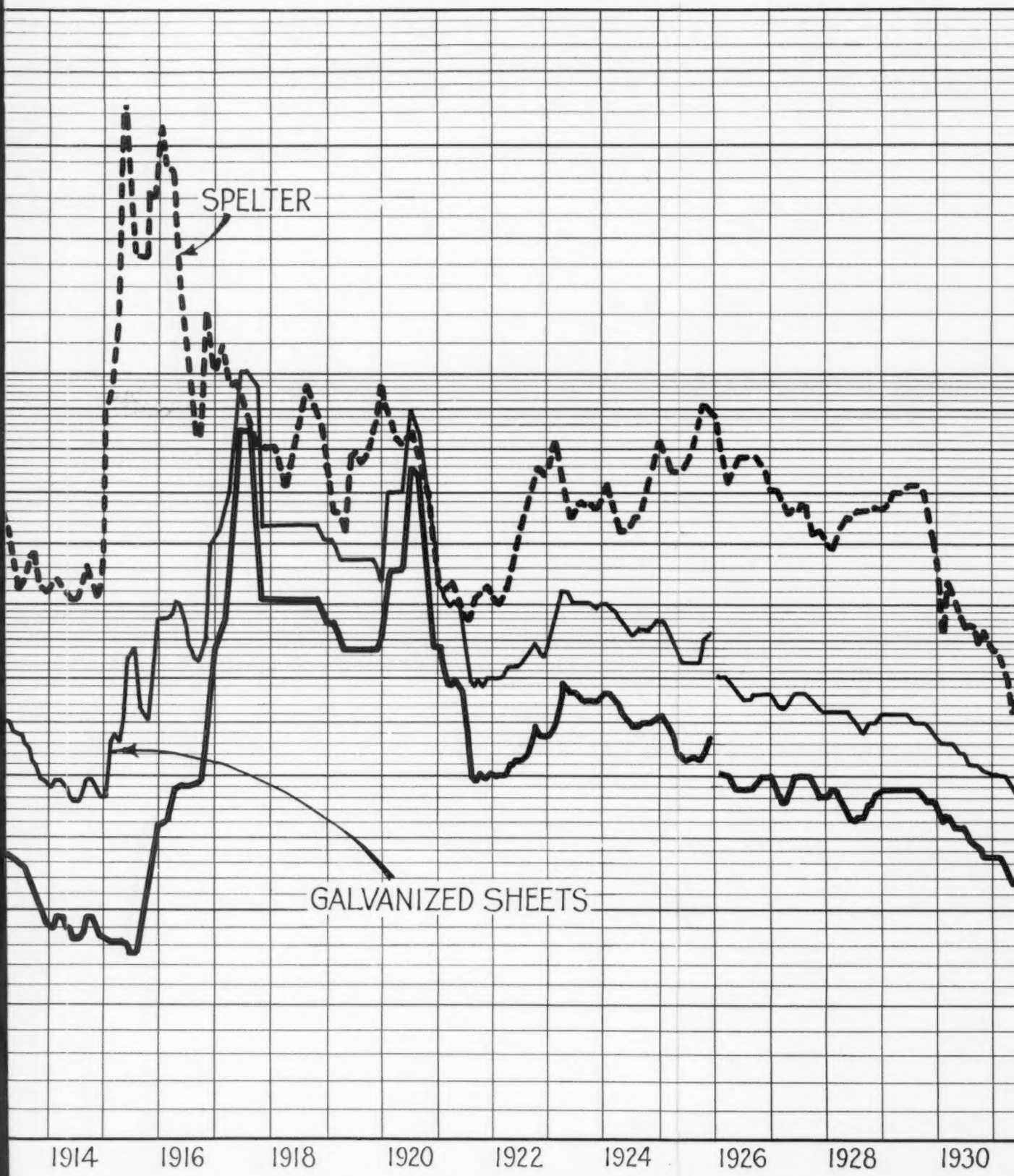
The addition of silicon, manganese and chromium to cast iron by means of ferroalloy briquets is reported to have grown in favor with foundrymen. It is pointed out that oxidation losses are reduced to a minimum and that the use of briquets provides an easy and positive method of making accurate alloy additions. Some improvement in physi-

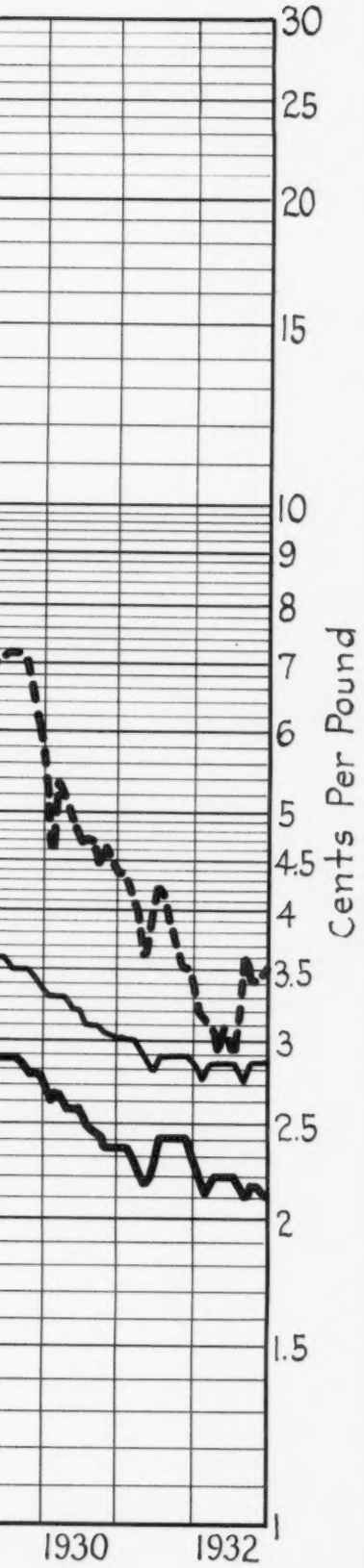
Thirty-Five Years of Prices of Black and Galvanized Sheets

(No. 24 gage sheets for 1926 and later and No

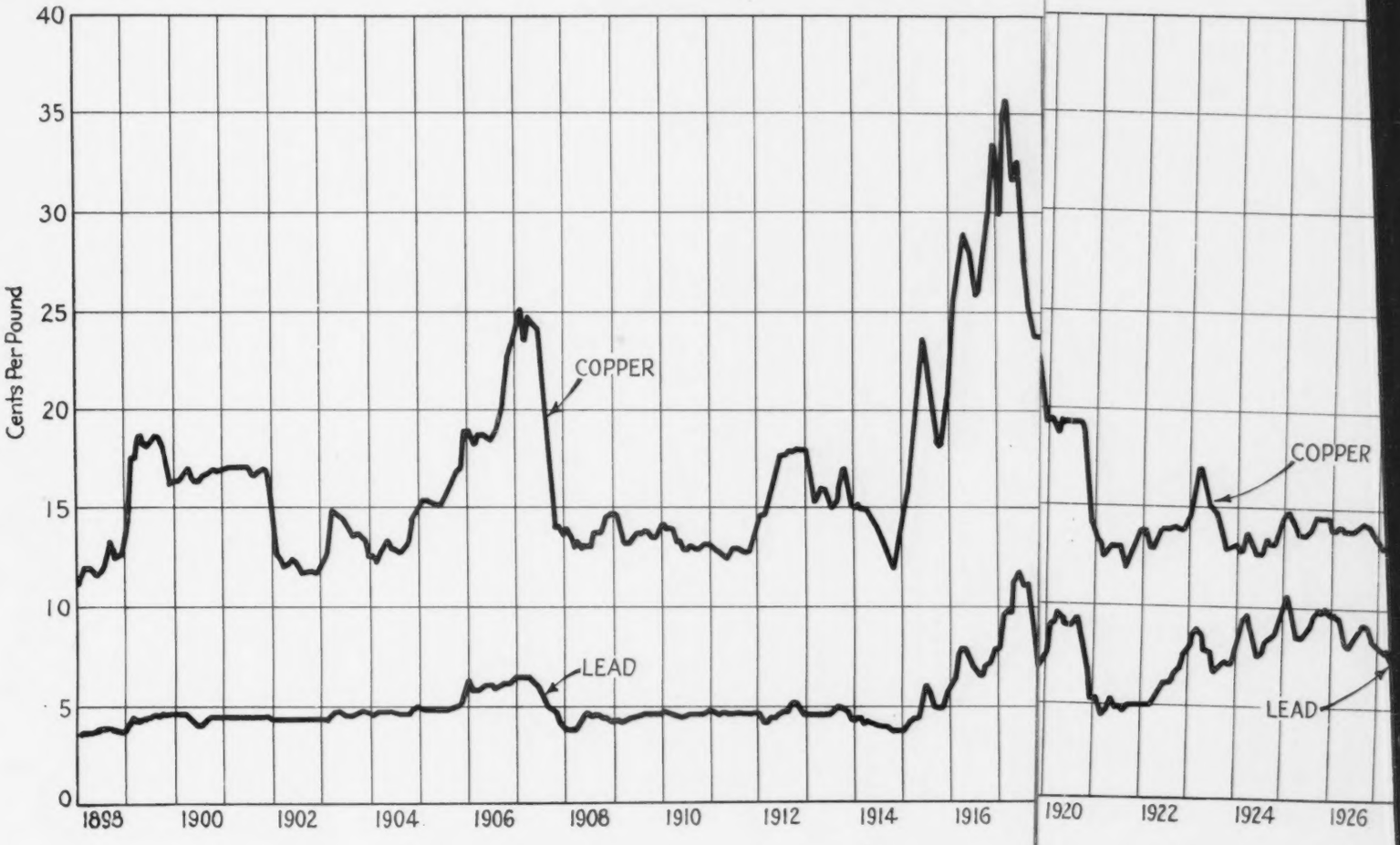


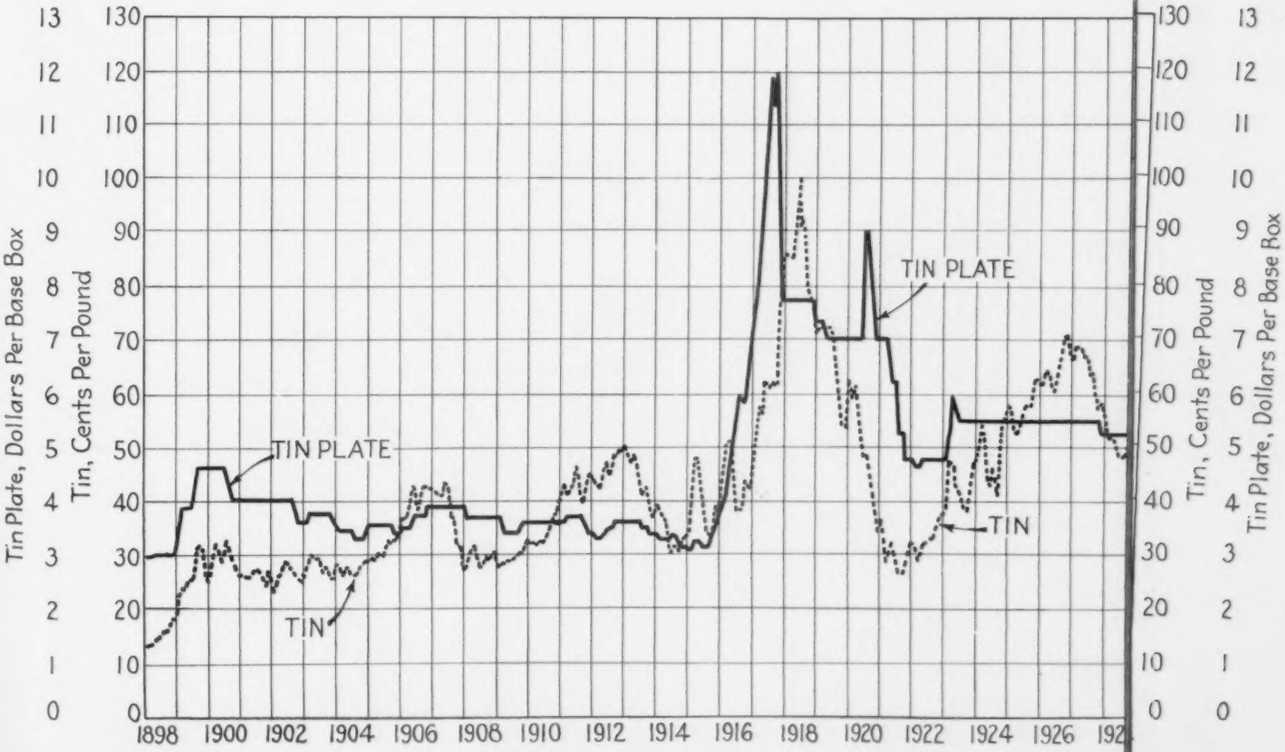
l Galvanized Sheets, at Pittsburgh, and Zinc, New York,
6 and later and No. 28 gage prior to 1926)





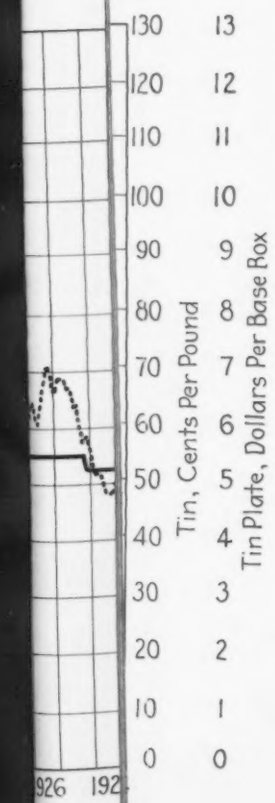
The Iron Age





Thirty-Five Years o
of Tin Plate, at Pit
and Tin, at New Y

Thirty-Five Years of Prices of Copper and Lead at New York Refinery, (Lake copper to 1920 and electrolytic copper since then).



Thirty-Five Years of Prices of Tin Plate, at Pittsburgh, and Tin, at New York.

cal properties of the iron is claimed from the introduction of the alloying elements by this means. A paper on the subject was presented at the annual convention of the American Foundrymen's Association in Detroit in May, 1932. The title was "The Use of Silicon and Manganese Briquets in the Cupola" and the author was Lynn H. Ransom, Keystone Driller Co., Beaver Falls, Pa. It is said that high percentages of chromium can be introduced by briquets.

Developments in Heat Treating

IN the heat-treating field one large producer of furnaces states that the advances made in the development of controlled atmosphere in electric furnaces for the bright annealing of both ferrous and non-ferrous metals and for scale-free heat treating were among the most noteworthy developments last year. While bright annealing did not originate last year, rapid strides were made in the art and furnaces were developed so that annealed materials could be produced at a cost to render this a practical process for the production handling of strip, sheet and material in other forms, both ferrous and non-ferrous.

In fuel-fired furnaces the development and application of modern fuel burning equipment of the luminous and diffusion types, both for increasing the rate of heat transfer and for producing a non-oxidizing atmosphere for scale-free heating for forging or heat-treating, was a feature last year.

Diffusion Combustion Heating

According to another authority in close touch with this field, diffusion combustion heating has made rapid strides in its application to large gas furnaces, both for heat-treating and forging operations. It is stated that in analyzing the Carbonal carburizing process in an electric furnace (described in THE IRON AGE, June 25, 1931, and *Machinery* for September, 1932), as compared with a modern oil-fired box furnace for pack carburizing, there was found to be a very large saving in operating cost from the use of the Carbonal process which requires no packing. This condition existed with oil at 4.5c. a gal. and with electricity at 1.25c per kwhr. The same authority says that the process is much better adapted to the use of electric heat than fuel.

From the same source comes the information that no little progress has been made in short cycle malleable annealing in gas furnaces. A furnace has recently been installed which has resulted in a reduction of the cycle of operation from 168 hr. to 48 hr.

Regulated Cooling

Regulation of the cooling, including the atmosphere during cooling, was announced by a leading manufacturer of electric furnaces. Several types of such furnaces have been constructed with special equipment for regulating the rate of cooling. A discussion of this phase of heat treating together with a description of the equipment was published in THE IRON AGE, Sept. 22, page 448. It is pointed out in this article that regulated cooling is advantageous in preventing oxidation or decarburization as well as in shortening the cooling time.

Last year a continuous type of furnace for bright annealing miscellaneous steel and non-ferrous parts was developed by the same company. The furnace is described as consisting principally of an electrically heated chamber, a water-jacketed cooling chamber and a light-weight heat-resisting alloy conveyor which is motor driven and capable of variable speeds. A suitable protective atmosphere in the heating and cooling chamber is provided. The furnace is suitable for bright annealing such products as stampings, punchings, sheets, etc.

Molten Bath for Aluminum Alloys

It is the practice now to heat treat aluminum alloys, used in the construction of airplanes and similar structures, at temperatures of about 975 deg. Fahr. A molten bath, consisting usually of a solution of equal parts of sodium and potassium nitrate, is the heat-treating medium. One type of furnace, developed for this purpose, uses the Calrod heating unit cast in iron of special analysis, these units being immersed directly in the salt solution. Another type of furnace for this purpose was described in THE IRON AGE, March 10, page 606.

Atmosphere from Cracked Ammonia

The trend in the development of heat-treating furnaces is the use of a protective atmosphere in the heating chamber for the purpose of preventing oxidation and also in some cases of reducing the oxides already present in the material to be treated. One of these developments in this connection is an ammonia dissociator. The source of the gas in this equipment is tanked anhydrous ammonia which is disassociated, giving a mixed gas containing 75 per cent hydrogen and 25 per cent nitrogen. More than one company has developed dissociators for this purpose (THE IRON AGE, June 16, page 1303). In addition to its use for artificial furnace atmospheres, cracked ammonia is being used for the reduction of metallic oxides such as molybdenum and tungsten, for atomic hydrogen welding, for aluminum welding, etc. With few exceptions hydrogen used in industrial operations may be replaced by cracked ammonia.

Insulating Firebrick

A development last year of considerable importance to builders of heat-treating and heating furnaces was the introduction of a new insulating firebrick by the Babcock & Wilcox Co., New York. Briefly, the nature of the new brick is such that much thinner walls of such furnaces can be constructed, with the result that there is a large saving claimed in time of bringing up to heat and in consumption of fuel. Full details of this new material will be published in an early issue of THE IRON AGE.

Progress in Nitriding

CONTINUED research in the field of nitriding has been a feature of the year just passed. The depression interfered very little with progress.

The nitriding of cast iron has been the chief development in the form of "nitrocastiron." This is receiving a great deal of attention abroad and is creating some interest in the United States. An authority in this field states that some of its characteristics, composition and service results should prove of wide interest. Because research work in this field has not progressed far enough, a general discussion of details has not been possible yet, but the prospects are that the final results will be of large industrial importance. An extended discussion of this development is scheduled for THE IRON AGE in the near future.

Nitriding of steel has gone on unabated, and today there are many successful applications to machine and other parts hardened by this process. These nitralloy steels are being successfully used.

Nickel in Nitriding Steels

Age hardening, or precipitation hardening, nitriding steels, represents a new development. This subject was discussed in a paper, "The Role of Nickel in Nitriding Steels," by H. J. French and V. O. Homerberg (THE IRON AGE, Oct. 5, 1932, page 534), which was presented at the annual convention of the American Society for Steel Treating in Buffalo, Oct. 3 to 7, 1932. The authors discussed the increase in core harness resulting from the exposure of steels containing aluminum and nickel to the nitriding temperature for a considerable period of time. A steel of this character was also discussed by Dr. A. Fry, the originator of the nitriding process, before the Iron and Steel Institute (British) last year.

What is claimed to be a low-cost production furnace of novel design for nitriding was brought out last year. It consists of a movable furnace chamber mounted on track wheels and located above a stationary hearth on which the nitriding retorts are placed,

making it possible to operate the furnace at will over one or more retorts. A description was published in THE IRON AGE, April 14, page 874.

New Heat-Treating Methods

Announcement of a new heat-treating process for carburizing steel was made last year. It is known as the "Chapmanizing" process, sponsored by the Chapman Valve Mfg. Co., Indian Orchard, Mass. (THE IRON AGE, Sept. 22, 1932, p. 465). The method is based primarily on the fact that iron or steel will absorb certain hardening elements. The case produced is from 0.010 to 0.025 in. deep, of which one-half is of extreme hardness which, measured by the Monotron, will range from 750 to 1000 Brinell.

Research in Fatigue of Metals

PHYSICISTS and metallurgists, interested in that highly important study, fatigue of metals, have by no means been inactive. Several valuable researches have been continued or initiated. Prof. H. F. Moore, college of engineering, University of Illinois, Urbana, Ill., a foremost authority in this field, has furnished the following concise resumé of the outstanding features of the past year:

> In the corrosion-fatigue of metals the autumn lecture of Dr. H. J. Gough before the British Institute of Metals has given us the best summary of that subject yet presented. He has at least furnished a tentative picture of the principal phases of this extremely important problem. The importance of the permanence and the toughness of the protective films on metal is becoming more and more evident.
>
> Study of stress concentration has gone forward, and the importance of recognizing the difference between a notch or groove produced by a *blunt* tool, involving cold work, and a notch produced by *cutting* has received further emphasis. The notch produced by cutting usually produces serious damage, while a notch produced by a blunt tool can actually strengthen the metal. An excellent contribution to the study of stress concentration was the paper by Peterson before the convention of the American Society of Mechanical Engineers in New York on Dec. 5.
>
> No reliable short-time tests for fatigue strength has been developed, but investigative research is progressing.
>
> Interest is being aroused in the possibility of spreading cracks under long-continued steady load. Such cracks have been observed in aluminum and steel at high temperatures and in lead alloys at room temperature. The cracks observed have been intercrystalline. So far no such cracks have been observed in steel at room temperatures, although experiments along this line are in progress.
>
> The function of ductility in metals in permitting a certain amount of cold work without starting a crack has been a subject of a good deal of discussion. The importance of this ductility is recognized, but the ordinary static tests for ductility are not satisfactory criteria.

Magnetic Testing

NO outstanding developments are reported in the field of magnetic testing during 1932. Commercial applications remained the same with limitations unchanged according to one authority, who also is of the opinion that the tendency has been to go back to more fundamental research in magnetism and the effect upon various magnetic properties of known variables in steel. In other words, the aim has been to get a sounder foundation so that a more intelligent interpretation may be made as to the mechanical and physical properties of a steel from observed magnetic properties. Fundamental research of this nature is being pursued by several well-known physicists. The effect of this on the future of magnetic testing, from both a scientific and commercial standpoint, is bound to be important.

The Magnaflux Method

The magnaflux method of testing steel for defects was described by Dr. A. V. deForest in THE IRON AGE, May 14, 1931, page 1594. It applies only to defects and discontinuities. The A. V. deForest Associates, 898 Madison Avenue, New York, report that this method has found wide application during the past year.

One of the most successful applications is on periodic inspection of motor bus parts. It has been applied by the Surface Transportation Co. of the Bronx, New York, to all parts of their large fleet. A number of serious defects in steering gear, connecting rods, crankshafts and elsewhere have been discovered before failure took place and with no additional expense over the previous usual careful inspection. The magnaflux test has also been successfully applied to fatigue cracks in large turbines by a large power company in Pittsburgh. It is in use in steel castings, components of airplane engines and on other magnetic materials.

Die Casting Practice Improved

Expansion in the use of die castings into many new fields was the chief development in this field last year. This was due to the perfection of new alloys, such as those of zinc, or the improvement of existing ones. Another factor was the use of higher pressures and more carefully controlled metal and die temperatures. Recent practice has greatly broadened the specification possibilities in that lighter wall sections, close tolerances and finer surface finish are possible. These developments have opened up many very difficult applications in many new industries.

High Test and Alloy Iron

Definite progress was made last year in the production of high test and alloy gray iron, particularly in electric furnaces. This product, whether made in the cupola or electric furnace, has come to be generally known as high test iron. There have been numerous papers before technical societies on this subject, among which may be mentioned "New Practice in Making High Test Iron Castings," by H. H. Judson, Goulds Pumps, Inc., Seneca Falls, N. Y. (THE IRON AGE, July 21, 1932), and "Molybdenum in the Iron Foundry," by J. Kent Smith and E. R. Young (THE IRON AGE, Aug. 25, 1932). Both papers were presented before the annual convention of the American Foundrymen's Association in Detroit in May, 1932. Another article of valuable interest was "Melting Gray Iron in the Electric Furnace," by Albert E. Rhoads, Detroit Electric Furnace Co., in THE IRON AGE, April 28, 1932.

In this field one of the outstanding developments last year was the adoption of electric furnace alloy iron as crankshafts and camshafts by two automobile companies, the Hudson and the Essex, with the persistent rumor that Ford is about to do the same.

Refinements in production methods have made it possible to produce an iron of high tensile strength, up to double that of ordinary gray iron, of increased wear, of heat and corrosion resistance and of decreased tendency to growth under heat. The use of nickel, chromium, molybdenum and vanadium has made the advances in alloy cast iron possible.

Rustless Steel Problems

No little progress was made last year in solving some of the troublesome problems that have resulted from the introduction of the rustless steels in industrial operations. One of the most vexing has been the failure of some of these steels at elevated temperatures because of interangular or carbide precipitation. By the introduction of certain alloying metals, such as titanium, it is claimed that this trouble has been greatly lessened. Research work in this field continues, and the coming year is expected to witness definite progress in the solution of this and other problems connected with the use of these steels.

An outstanding feature of the last year is the remarkable way the output of rustless steels has held up in

Concluded on Advertising Page 44

New Steel Capacity of 100,000 Tons Smallest in Years — No Pig Iron Expansion

ADDITIONS to pig iron and steel-making capacity in 1932 were the smallest in many years—possibly at the lowest total in the history of the American steel industry. A total of only 100,000 gross tons for steel making is reported as completed last year with no expansion in blast furnaces. New capacity for erection in 1933 is zero, as might be expected.

According to information supplied by companies having blast furnaces, steel plants and rolling mills, the following important facts include the main features regarding new construction and equipment added in 1932 and planned for 1933.

The only steel-making capacity completed last year was by the Ford Motor Co. at its plant at Dearborn, Mich. A 400-ton tilting furnace was substituted for a stationary furnace and two 600-ton mixers were erected to replace one dismantled. This represented a net expansion of approximately 100,000 tons. This increase compares with one of 4,075,000 tons in 1931, which was the result of the completion of an extensive program inaugurated mainly by the large steel-making companies in 1929. The next smallest since the war was the 227,500 tons in 1922.

Blast furnace expansion was at a standstill in 1932. One company built a new furnace to replace an old one and another company rebuilt one of its stacks. Expansion due to this is largely offset by the dismantling of furnaces by other companies. The last major expansion was the addition of a new 600-ton stack in 1930. Besides last year, there were three other years since the war in which no new furnaces were added—1923, 1927 and 1931. There have been five post-war years when only one furnace was added—1921, 1924, 1925, 1929 and 1930, with two additions in each of the years 1919, 1922, and 1928. The post war years of largest expansion were 1920 and 1926 when six furnaces were erected each year with a capacity respectively of 875,000 and 1,255,000 tons.

Some companies made substantial additions and alterations in their rolling mill capacity, but these were by no means as extensive as in former years. Plans for 1933 are meager.

Data regarding electric furnace expansion have been unavailable. It is known, however, that new installations were few last year.

In the following paragraphs will be found the main features which steel companies have reported to THE IRON AGE.

Reports of Various Steel Companies

The Steel Corporation

New construction completed during 1932 and under way as of Jan. 1, 1933, by subsidiary manufacturing companies of United Steel Corpn. is as follows:

CARNEGIE STEEL CO.

Completed

Central scrap preparation plant at Duquesne, Pa.

ILLINOIS STEEL CO.

Completed

South Works: Extending ore handling facilities at blast furnaces, and two electric induction furnaces and auxiliary equipment for stainless steel.

Gary Works: Two additional batteries of 69 ovens each at by-product coke plant, and coiling equipment and pickling facilities for strip steel.

NATIONAL TUBE CO.

Completed

Lorain Works: Equipping furnaces in skelp and pipe mills to use natural gas.

Under Way

Ellwood Works: Reconverting No. 8 seamless mill for economic production of O. D. tubing with range from 2 to 4½ in.

OIL WELL SUPPLY CO.

Under Way

Imperial Works: Continuous heat-treating furnace.

AMERICAN SHEET & TIN PLATE CO.

Completed

Gary Tin Works: Four-high cold reduction mill and equipment for continuous finishing and tinning cold rolled strip.

Gary Sheet Works: Two continuous pack furnaces and one continuous pair furnace.

Vandergrift Works: Two continuous pack furnaces and automatic rollers and catchers tables.

Under Way

Gary Tin Works: Improvements to cold reduction mill.

Gary Sheet Works: Modernizing hot mill department, including continuous heating furnaces with mechanical handling equipment, and 3-high finishing hot mill and motor-driven 4-high cold mill.

Vandergrift Works: Modernizing hot mill department, including continuous heating furnaces with mechanical handling equipment, and 3-high finishing hot mill and motor-driven 4-high cold mill.

TENNESSEE COAL, IRON & RAILROAD CO.

Completed

Fairfield Works: Rearranging finishing facilities at bar and structural mill and additional boiler and cooling tower at electric power station.

Under Way

Fairfield Works: Extension of sheet mills.

COLUMBIA STEEL CO.

Completed

Torrance Works: Normalizing, annealing, pickling, cold rolling and auxiliary equipment for finishing sheets.

Bethlehem Steel Corpn.

Subsidiary companies of Bethlehem Steel Corpn. report the following principal improvements and additions completed in 1932 and under way at the close of the year:

Completed

Bethlehem Plant: One gas driven twin blowing engine.

Maryland Plant: Normalizing furnace and drier for sheet mills, and extension to warehouse at wire mills.

Cambria Plant: Heat-treating department at wheel mills.

Under Way

Maryland Plant: New turbo blower for blast furnaces; new blast furnace "D" replacing former "D" furnace; gas cleaning and distributing system for blast furnace gas; three gas disintegrators, moisture eliminator and mains for clean blast furnace gas; installing 8-in. bar mill, including necessary buildings and equipment.

Jones & Laughlin Steel Corp.

Installation of two continuous pair and pack heating furnaces by the Jones & Laughlin Steel Corpn., at its Aliquippa, Pa., tin mills was begun during 1932. A push bench tube mill, announced one year ago as nearing completion at the same plant, was finished and placed in operation in a limited way. In October, 1932, dismantling of the Soho blast furnace at Pittsburgh was commenced. The company has no definite plans for 1933.

Ford Motor Co.

Ford Motor Co., Dearborn, Mich., during 1932 completed the construction of and placed in operation a 400-ton tilting type open-hearth furnace and two 600-ton hot metal mixers, replacing other equipment. After a short period of operation these were shut down because of the restricted operations of the Ford steel plant.

Otis Steel Co.

Otis Steel Co., Cleveland, early in 1932 completed the construction of a 72-in. continuous strip mill, which was placed in operation in the spring, and later in the year constructed a cold mill with rolls, 72 in. wide, to cold roll steel produced on the continuous hot mill. The cold mill placed in operation in September consists of two 4-high tandem stands. Auxiliary equipment installed included a continuous pickling machine for welding

Concluded on Page 62

Improved Materials Widen

◆ ◆ ◆

SCARCELY anything in modern life exceeds in interest and portending significance the romance of changing materials. A new material springs into existence and in its wake must follow a whole chain of new processes and new equipment required to transform it into useful shapes. New tools—new presses—new high pressure fittings — new electrically heated work tables may be needed for its manufacture. And after it has been successfully produced — has been formed and machined into useful shapes—it may enter industry and there cause a whole future sequence of modified practice with its resultant further modification of equipment.

Typical of this was the development of the tungsten carbide group of alloys which not only caused major machine tool changes but which had, and still continues to have vigorous effect on the introduction and use of other materials in industry. Another example is the recent arrival of high strength plastics. These not only call for new methods of machining and forming but by their light weight and their resistance to centrifugal forces they have altered processes and possibilities in the rayon industry.

Details to Follow

The details of some of these cycles of change will be given under the different headings which follow in this section. Here the desire is to emphasize the far-reaching significance of the progress in materials production during 1932. Materials after all are the basis of all human activity and changes in methods and processes are only possible as materials make them possible. Improvements in one direction almot invariably create new problems in the design of associated parts.

Of course the need for a changed method often furnishes the incentive back of the development of a new material. In automobile design, for instance, in order to increase the life of tires, air pressures were reduced and this meant larger tire diameters which, in order to keep from increasing total wheel diameters, meant reduced diameter of rims and, therefore, reduced diameter of brake bands with the resultant new demand for better brake materials.

As tires increased and the whole trend in automobile design favored lower and lower chassis, the wheel rim diameters decreased still further, and thus still further increased the problem of proper braking. Then, to add to the difficulty, the speed of automobiles was greatly increased. Thus manufacturers were faced with the necessity of providing greater braking power than ever, on much smaller brake drums, with scant means for cooling. A new material for drums was needed to meet the situation.

Buyers Become Exacting

One of the significant developments of the year was the changed attitude of the producer of materials and the greater independence of the buyer. Instead of letting quality fall off as many predicted early in the depression, manufacturers generally have had to improve the quality of their products in order to satisfy the more and more meticulous demands of the buyer. The buyer, himself faced with the utmost need for economy, often refused to spend any money whatever to correct defects in incoming shipments.

Materials Must Meet Specifications

FROM the point of view of the user of materials I would say that the year 1932 of the depression has brought no let-up in quality of materials and I would be inclined to go further and say that there has been an actual improvement in conditions in this respect. The economic situation is largely responsible inasmuch as it has led each producer to do considerable development work in order to maintain his share of the reduced total demand. The same economic situation has compelled some suppliers of material to branch out into new fields. This activity is not without some dangers as, with less experience and less rigid inspection in the new line, mistakes may be made which would reflect against the materials or the manufacturer.

The increasing tendency in industry to maintain low inventories has made it imperative that materials be in line with specifications for the reason that the rejection of a shipment by a user might cause a shutdown in the user's plant until a further shipment could be made. This very danger has caused users of material to select suppliers with much greater care than heretofore. The user wants to know that the manufacturer of his raw material is in a position to give efficient technical control of his product.

J. M. HIPPLE,
General Works Manager
Westinghouse Electric & Manufacturing Co.

Markets—A *Review of Progress in 1932*

BY HERBERT R. SIMONDS

Against the more rigid inspection of the buyer of course has been the temptation to lower the quality of material in order to be able to submit a better price. But the buyer, struggling to maintain his own precarious position, has been forced to adopt a buying shrewdness unknown some years ago. Several companies during the year adopted the policy of specifying performance for the steel bought instead of specifying the physical or chemical characteristics. This usually is welcomed by the steel producer as it furthers cooperation between the producer and the user, and the producer realizes that it is only through the business success of the user that he himself can secure trade.

This attitude is illustrated by the experience of a manufacturer of steel drums. He received a complaint from a firm buying his drums, as follows: "I cannot ship my product in your drums because it becomes rust-stained in transit." The drum manufacturer immediately referred this note to the steel works which supplied the sheets and in a short time the metallurgist of the steel company was at the manufacturer's plant in an earnest conference which resulted in the use of a new kind of sheet and a new method of handling to prevent the possibility of rust. Some years ago a different report might have been expected from the steel company. The alert manufacturer will take advantage of technical help from the firms supplying his raw material.

Vision is Required

One of the most important problems for many manufacturers to solve is what material to use for a given purpose. The use of the wrong material may be so serious as to cause the company to lose in its struggle for existence. A manufacturer of an important new alloy bewailed the fact that he could not introduce this even when he could demonstrate conclusively its physical and economical superiority. The introduction of almost any new material involves a great program of education. One authority dealing with materials and stressing the personality of certain new metals said: "Raw materials mean nothing to those who do not know how to win and use them." Vision is required in the application of new materials and in the discovery of new uses for old materials.

Just as new materials have affected the entire chain of fabricating processes, so have new processes affected the nature of materials. Perfection of the technique of butt-joining plates and sheets by flash welding, for instance, has made it possible for some manufacturers to save money through the purchase of small sheets and the butt welding of these to form larger sheets.

Multiple layer materials have found increasing favor in many fields during the year. Nickel-clad steel has reduced the cost of chemical resistant containers formerly made of solid nickel. Lead-lined tanks, porcelain and glass-clad steel plates and many similar products have been developed. One multiple layer material is the familiar shatter-proof glass for automobile wind shields.

Art in Industry

At the plant of the Worcester Pressed Steel Co. a permanent exhibit of materials is maintained more from

New Alloys for Steel Making

RECENTLY three commercial steel making alloys have been put on the market and are being produced in considerable quantity. These are as follows:

	Percentages		
	Carbon	Manganese	Silicon
High Silicon Spiegel	4	20	4
Silicon Spiegel	3	30	7
Silico Manganese ..	2	70	16

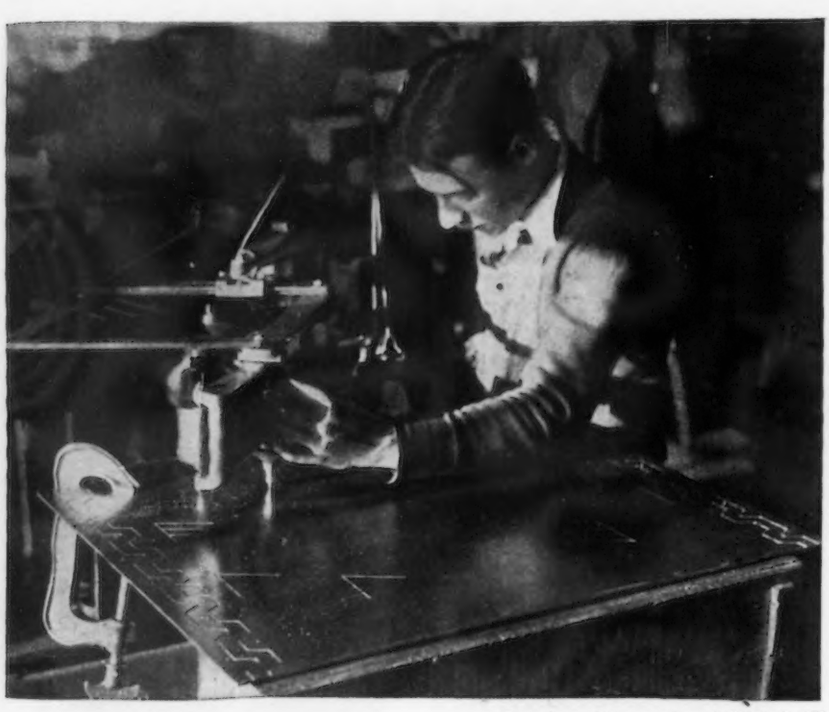
A large tonnage of steel has been made with these alloys and the saving in ferro manganese through their use is important. These three alloys can be produced in quantity from our domestic ores although the ores available for the production of silico manganese are somewhat limited. Recent experimental work has shown that alloys of manganese, silicon and aluminum hold a great deal of promise for steel making as these alloys are stronger deoxidizers than the alloys listed above. These triple alloys can also be produced from our domestic ores and an important feature is that steel can be made from 10 to 30 per cent cheaper with them than if ferro manganese and silicon pig iron are used. These cost figures are taken from plants which have run over an extended period with manganese silicon alloys.

C. H. HERTY, JR.,
U. S. Bureau of Mines
Pittsburgh

an academic point of view than from one of strict business expediency. Specimens of armor and other metal products from early antiquity down to the present time are on display. When questioned about the practical side of the exhibit the manager said among other things it furnished ideas for design and style in new products.

Art in industry is a popular topic at present and this trend has an important bearing on materials. Decorative chromium strips for instance are being used to give a new appearance to such prosaic items as meters, recording instruments and laboratory furnaces.

An interesting result of the study of ancient materials is the frequent possibility of determining from the chemical and physical analysis of a specimen its approximate age. One investigator in cooperation with the Metropolitan Art Museum in New York is preparing a history of metals from examination of specimens of chain and plate armor.



Courtesy International Nickel Co.

THE increasing importance of art in industry has significance in its contrast to the automatic machine age. Art, whether in industry or in a gallery, presupposes an artist, and however automatic production processes may become, the inculcation of art principles into manufacturing means greater use of skilled workers and a return of the opportunity for individual expression. This operator using a Gorton Pantograph is transforming a steel plate into a decorative panel.

New Forms of

WHILE the chief developments in carbon steel during 1932 were in the fields of dimension, finish and use rather than of composition, much new steel manufacturing equipment was designed and built and this in several instances was responsible for changes in the character of the steel produced. The trend in furnace design toward the use of a protective atmosphere in the heating chamber has made it easier to manufacture bright annealed products such as sheets, stampings and punchings, and the refinement of control equipment has made it possible to secure more uniform physical properties. One of the interesting items in point is the photoelectric pyrometer developed by the General Electric Co. and described in greater detail elsewhere. In addition to this, continuous gaging equipment and automatic measuring devices have invaded the sheet and tin plate section of the industry.

The Morgan Construction Co., Worcester, Mass., has completed the design of a 4-pass high-speed continuous rod mill. Heretofore, high-speed continuous mills have been limited to 2-pass design. The new trend is expected to reduce the cost of manufacturing rods and wire.

New Structural Shapes

In structural steel work new shapes and new uses have been developed. The Belmont Iron Works, Philadelphia, has introduced its new type of steel floor into many structures. This floor is exceedingly simple and employs standard structural steel stair channels such as rolled by the Jones & Laughlin Steel Corpn., Pittsburgh. The channels are arranged with overlapping flanges in alternating positions—one channel up and the next channel down—and the joints are welded. This construction was used for the deck of the recently completed steel pier for the Reading Railroad at Port Richmond, N. Y.

The American Rolling Mill Co., Middletown, Ohio, has featured a patented Z-form in the construction of steel floors and walls. In this design a so-called "Z" of uniform section, pressed from 18-gage or 20-gage hot rolled sheet, forms a unit which when overlapped with others and with joints welded, forms a series of connected metal boxes giving strength, light weight, and heat resistance.

Frameless Steel Houses

What is reported as the first frameless steel house was completed in October, 1932, near Cleveland, with this "Z" type of walls and floors. The building, made up essentially of large,

ns of Steel Appear

A CONSTRUCTION unit known as a longitudinal "Z", pressed from 18-gage hot-rolled steel, is used for floors and walls of frameless buildings.

lightweight panels which support the roof and which contain window and door openings, was constructed by Insulated Steel, Inc., Cleveland, in cooperation with The American Rolling Mill Co.

This presages extensive activity in frameless steel houses and those interested describe possibilities in glowing terms. A large part of the frameless steel house of the future will be factory-produced with no waste and no field cutting or fitting. The walls in the Cleveland house were made of 20-gage sheets, were less than 4 in. thick, and because of the light construction it was possible to assemble them in large sections, room-wide and story-high, with window and door frames in place and all welded into single units. These were hauled to the job like stage scenery. The floor also was built up from "Z" sections lapped and welded. Porcelain enamel shingles were used.

Factory to Build Houses

A most significant outcome of this new type of construction is the fact that a new factory is to be operated for manufacturing the forms and materials for frameless steel houses. Insulated Steel, Inc., has already placed orders for the production machinery which will be set up in a factory in the Cleveland district early this year.

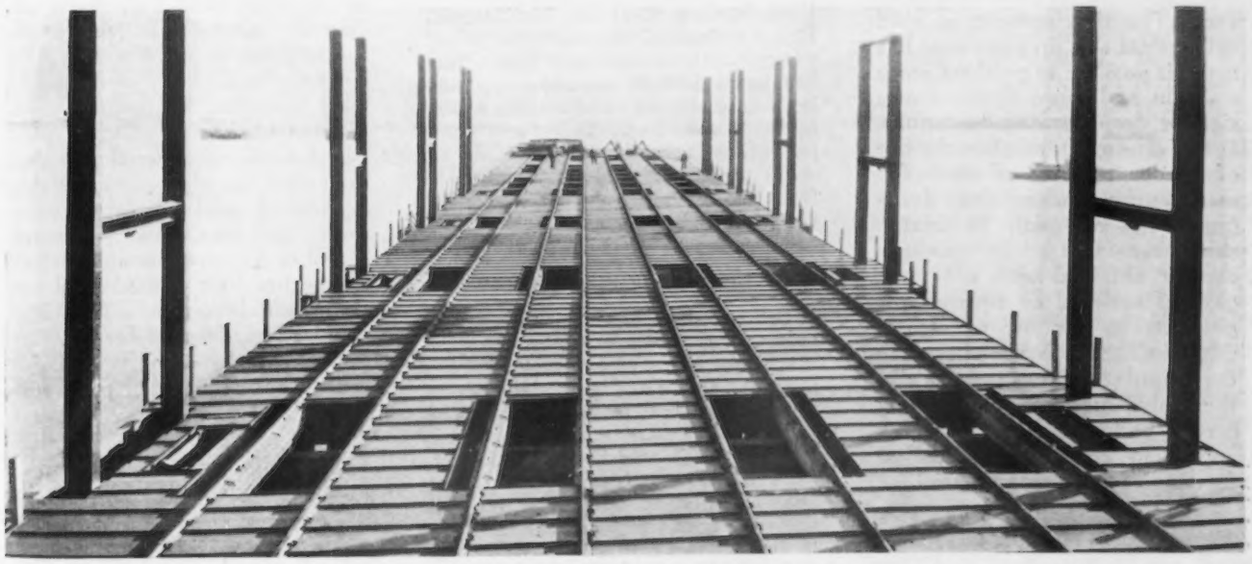
What is said to be the first self-supporting steel roof was constructed during the past year as part of the covering of a new concrete grain elevator. The roof consists essentially of built-up lengths of steel sheets fastened to rigid supports at both ends and welded to other sheets through the entire length to form the complete covering. In the construction of the roof 60,000 lineal feet of welds were required. The strips were made up of 12-gage mild steel sheets and the total area covered was 140 ft. in length and 50 ft. wide. Each strip was built up on the ground by welding sheets of small dimensions. It was then hoisted into place and tack welded. The complete welds were made after all material was in place. In final position the roof sags in a gentle catenary curve from the upper to the lower support.

Innovation in Boiler Tubes

Steel and Tubes, Inc., Cleveland, has developed a method of making tubing from strip steel in a continuous process. The strip is projected through a series of rolls forming a round butted tube which passes under revolving copper electrodes with current passing across the seam of the tube between the two electrodes. At the same time, pressure is applied which, together with heat below the fusion temperature, accomplishes the weld. This type of tubing, which has been accepted by the National Board of Boiler Rules and by various insurance companies, marks the first departure from boiler tube practice for many years, as heretofore only seamless and lap-welded tubes have been acceptable for this service.

The Bethlehem Steel Co. has produced sheets of finer grain structure and greater ductility by a new normalizing process equipped to normalize both sheets and tin plate within mill rolling limits. The new process involves higher temperatures than were possible with the box-annealing method formerly used.

This same company has developed a process to prevent internal thermal cooling cracks in standard rails. This is known as the Sandberg-Oven process and consists of a heating chamber and a cooling chamber. The rail after leaving the hot rolls is allowed to cool on the hot bed to a temperature of approximately 1000 deg. F. It is then charged into the hot zone of the Sandberg oven where the initial heat in the rail soaks out so that the head, web and base equalize to the same temperature. The rail then passes



A type of interlocking welded steel deck was used on the all-steel pier recently built by the Belmont Iron Works for the Reading Railroad at Port Richmond, N. Y.

slowly through the cooling chamber where by retarded cooling the internal strains are reduced. The Lackawanna plant of the Bethlehem Steel Co. is now producing rails by this process.

The Inland Steel Co., Chicago, developed methods during 1932 for producing longer and wider sheets than it had heretofore produced and, in some gages, wider sheets than had previously been produced by anyone else. The extreme width in hot rolled sheets is 70 in. with a length of 1200 in. In cold rolled the extreme width is 66 in. and the length 228 in. These dimensions do not apply to every gage. When questioned as to rate of production, J. L. Block, vice-president of the company, said: "The rate of production depends upon the class of material being rolled, but our operating officials estimate the rate of operation of the hot mill at 1300 ft. per minute and the monthly capacity of this mill at 60,000 tons. These figures depend upon ideal conditions which we do not enjoy at the present time."

Rapid changes in buying methods have been made, showing a greater independence on the part of the small manufacturer using rolled steel products. Instead of buying bars in random lengths, forge shops and others are buying bars cut to specified lengths in order to save material. The established practice at several shops is to specify lengths on bars 1½ in. in diameter and larger, and to buy random lengths in smaller sizes. The use of thin gage steel sheets has been widened by the development of a sheet-cutting machine working on a pantograph principle and capable of cutting intricate designs in sheet steel up to 18-gage thickness.

Better Tin Plate

OUR experience indicates that important advances have been made in tin plate and in its use. The development of cold rolled steel as a tin plate base has made it possible to produce more uniform and more ductile material for deep drawing operations. It has also made possible the use of harder tempers of stock for many purposes where deep drawing is not essential. Naturally, this means that stiffer products can be obtained with the same gage of material or equally stiff products by the use of lighter gages in the harder tempers. In these harder tempers there is also the advantage of eliminating breaks and strain marks which appear in curving and shallow forming of dead soft material.

E. V. CRANE,
E. W. Bliss Co.

Electric Welded Pipe

WE have recently developed an electric welding process for producing Toncan iron pipe. We believe this is the first time an iron pipe of corrosion resisting character has been produced by any method other than the conventional fire welding methods. Tests show our new weld to be exactly as strong as the pipe itself. The pipe is round with uniform wall thickness and entirely free from scale both inside and outside. This feature tends to minimize the pitting type of corrosion.

REPUBLIC STEEL CORPN.,
Youngstown, Ohio

This machine is made by Multi-Products, Inc., Fitchburg, Mass.

The Republic Steel Corpn., Youngstown, Ohio, has extended its production of low silicon strip to include lengths up to 200 ft. or more. In line with the insistence on the part of the user for material exactly suited to his needs has come the development of special shaped bars. Instead of using round bars, some users are demanding elliptical or even modified pear-shaped bars. A. B. & J. Rathbone, Palmer, Mass., have produced special section rods in carbon steel and in alloys.

One of the developments to improve the quality of steel is the deseaming blowpipe of the Linde Air Products Co., New York. This is used for removing cracks or seams in billets, slabs and rounds in the steel mill.

Winged Molds for Ingots

Another improvement, reported by Firth-Sterling Steel Co., McKeesport, Pa., consists of a new design of winged molds for casting ingots. This has been put into practical use and is said to improve the structure at the center of the bar. This same company has recently transferred all steels previously made in the crucible furnaces to Ajax electric induction furnaces and reports a distinct improvement in uniformity and quality.

Buttwelding Steel Sheets

The technique of flash welding has been so well developed that some manufacturers are saving money by buying small sheets and buttwelding these together to form larger sheets. The operation of welding and of cutting off the beads which form on both sides of the sheet is performed almost automatically at one plant. Flash buttwelding of irregular-shaped sheets is done at the Edward G. Budd Mfg. Co.'s plant at Philadelphia to reduce blanking operations.

The use of coated sheets has been extended. Felt and asphalt coated steel sheets have been produced to prevent corrosion and to improve appearance over the usual galvanized sheet. Felt coated steel sheets have been used to cut out one or more operations in the manufacture of such articles as felt-lined eyeglass cases and jewelry boxes. Centrifugal painting and coating of metal parts is announced by Leon J. Barrett Co., Worcester, Mass. The articles are placed in a container and coating materials enter through a valve. Every corner and crevice is said to be immediately and uniformly coated. Threads in tapped holes do not clog. There is no dripping.

Direct Process Steel

Several years ago C. W. Hazelett, of Cleveland, invented and developed the Hazelett process for the production of sheet lead direct from the molten metal. In the past few months this process has been successfully applied to the production of sheet steel in a plant in Ohio. Extensive experimental work in this field is being conducted by the Scovill Mfg. Co., Waterbury, Conn., and it is understood that another firm is negotiating for the operation of a 42-in. sheet mill by this process. L. P. Molkov, in Russia, has developed a process for the direct production of pulverized or "dust" iron from pulverized ore.

The cost of the standard method of steel production has been lowered by the development of new silicon-manganese alloys to replace ferromanganese and ferrosilicon.

Heat Treated Bars from Stock

SEVERAL grades of heat treated stock bars have appeared. One, with the trade name Ryco, is a hot rolled, heat treated, machine straightened steel intended for general production work. It is often used where a steel stronger than either mild steel or cold rolled shafting is desired, and where the cost must be less than chrome-nickel or 3½ per cent nickel steel.

Another heat treated steel has the name Nikrome. This is a standard grade used for automobile axles, drive shafts and for special bolts and other parts subjected to heavy stress. It has a tensile strength of more than 125,000 lb. per sq. in. and a minimum yield of 105,000 lb. per sq. in.

Joseph T. Ryerson & Son, Inc.

Steel Will Enter New Fields

ALL industries recently have been brought face to face with the problem of reduced manufacturing costs and the need for the development of new markets. The problem of production costs is one of individual action, but the development of new markets frequently calls for the cooperative action of an entire industry.

During 1932 the American Iron and Steel Institute was reorganized to deal with market developments as they affect the entire iron and steel industry. Recent additions to the membership of the American Institute of Steel Construction established in that organization a new phase of market promotion. Truly the steel industry is rapidly putting its house in order and is preparing to move ahead as an entire industry acting as a unit. The development of new products and new markets in the structural steel fabricating industry involved problems not existing in other branches. It alone must coordinate industrial production with the technical standards of the engineering and architectural professions and must comply with precise legal conditions as fixed by various building codes and bridge construction laws.

Manufacturers may develop valuable economic processes, but their application in structural steel work depends upon the acceptance by both the code regulations and the technical professions. Either one has the power of veto. For instance, we know definitely by tests that steel piles are more efficient than most materials for carrying foundation loads, but to promote their acceptance it is necessary to overcome traditions and formulas of doubtful accuracy. This question involves consideration of public safety and economy combined with a vast potential market for steel and must be dealt with on sound principles.

The American Institute of Steel Construction's activity on steel battle deck floors has been followed by several types of steel floor construction covering the entire range from light residence floors to heavy warehouse and bridge floors. It seems certain that when construction resumes normal development, steel will play a constantly increasing part in many fields where it was unknown a few years ago.

L. H. MILLER,
Chief Engineer
American Institute of Steel Construction

Alloys Move Forward

PROBABLY the most spectacular development in the broad classification of materials has occurred in the field of alloys. Steel alloys which received a strong impetus two or three years ago with the development of the 18 and 8 group and the nitridable steels, moved strongly ahead during 1932 with new practical application and new methods of fabrication. In addition, many new alloys were developed during the year and physical properties were pushed a little further ahead all down the line.

The International Nickel Co., New York, introduced a new alloy known as Inconel. This contains 80 per cent to 81 per cent pure nickel, 12 per cent to 14 per cent chromium, and the balance is iron. It is primarily intended for use in the dairy industry, especially in handling certain milk derivatives where all other alloys tested either produced stains or else added a new taste to the products. Inconel is said to have the corrosion resisting properties of nickel, together with the surface compactness and tarnish freedom of chromium. The metal successfully withstands all sterilizing solutions commonly used in the dairy industry, according to the report.

The Lebanon Steel Foundry, Lebanon, Pa., developed two new stainless cast steels. One of these features the use of selenium to give freer machining properties. The other contains from 4½ per cent to 6 per cent chromium with enough molybdenum to obtain resistance against high temperature. This is especially designed for use in the oil industry.

Selenium Enters the Picture

Selenium is used by the Carpenter Steel Co., Reading, Pa., in the production of a rolled steel known as Stainless No. 8. This is claimed to be the first selenium steel alloy in a rolled steel product. It is said that this selenium nickel chromium alloy can be used on automatic screw machines at speeds up to 70 per cent of the speed used on ordinary screw stock.

Monel metal showed a marked expansion in its application. One of the principal items was its extension into the household. After 25 years in industry, this alloy is now entering the home in the form of decorative architectural features and kitchen equipment and fixtures. During the year, new processes have developed a monel metal rod of greater strength than heretofore attainable. A tensile strength of over 100,000 lb. per sq. in. has been secured in 3-in. to 6-in. forgings, combined with an elongation of 25 per cent.

A. B. & J. Rathbone have succeeded in drawing special shape rods and wires of monel metal. Other products which this company is drawing into special shapes are phosphor bronze, pure nickel and stainless steel. In certain fields there has been a demand for metals having the characteristics of steel with exceedingly low coefficients of thermal expansion. The U. S. Steel Corpn. has developed a low carbon chrome steel which shows a coefficient of expansion in the temperature range of from 32 deg. F. to 212 deg. F. of about 0.0000056. Two other alloys, Invar metal and Dilvar

Vanadium Alloys Featured

DURING 1932 our research department was particularly active in the production of new steels for certain definite purposes. In the high-speed steel field, extensive experimental work with vanadium alloys was conducted, resulting in the development of a grade we call Electite Vanadium, which we now have in regular production. This is a high-speed steel containing the usual amounts of tungsten and chrome but with a higher carbon content and with the addition of vanadium. It hardens to about c-67 Rockwell and is used for cutting hard materials and when a good finish is required.

For hot working we have produced a grade of steel called PXD. This is of the high tungsten type of hot work material similar in some respects to our E.H.W. hot-work steel. It has proved superior for such work as piercing points for the hot piercing of billets for seamless tubing, for hot forging dies for forging machines and all similar uses.

Much work has been done on stainless steels and stainless irons. This line of research has uncovered more uses for regular material of this type and special composition stainless materials have been developed to meet certain particular conditions.

Latrobe Electric Steel Co.,
Latrobe, Pa.

metal, show still lower coefficients of expansion under certain conditions.

Nitriding Steels Expand

Progress in the field of nitriding is reported by Dr. Victor O. Homerberg, Massachusetts Institute of Technology, and is given in greater detail elsewhere. One of the chief changes made in the material has been the introduction of higher sulphur content into the nitralloy to give it better machining properties when maximum impact resistance is not necessary. Wheelock, Lovejoy & Co., Cambridge, Mass., developed a molybdenum steel known as Economo No. 50 which they announce combines excellent machining qualities with high physical properties. A lightweight heat resisting alloy was developed by the General Electric Co. for use in conveyors in continuous annealing furnaces.

A. R. Allard, works manager of the South Philadelphia works of the Westinghouse Electric and Mfg. Co., reports as follows: "The use of nitrided steel has been extended during the year, especially in valve construction. Nickel-molybdenum steel has been used for marine reduction gear pinions. The addition of molybdenum to 13 per cent chromium steel has imparted desirable improvements to this alloy for certain parts of steam turbines."

The efforts of the research department of the Ludlum Steel Co., Watervliet, N. Y., were directed during the year toward new uses for nitriding steels. In addition and to satisfy a demand for a free machining material, a new alloy was developed which it is said combines the properties of the previous nitralloy but also has machining properties similar to ordinary screw stock. This material is now available in the form of bars, wire and billets.

The Hazard Wire Rope Co., New York, reports further improvement of its corrosion resisting steel wire rope. This is a chrome-nickel steel rope which the company states is unaffected by salt water as well as by most of the usual chemicals encountered in industry.

Service Tests Needed

While the depression has increased competition in some lines and has thus stimulated the development of new materials, the fact must not be overlooked that the final test of any new alloy is in service and a greatly reduced demand often makes this service test difficult. The Edgar Allen Steel Co., Inc., New York, for instance, reports that it has developed some interesting products during the year with extraordinary properties, but it states: "The tests are purely preliminary and the real measure of these tests can only be estimated. When once again the heavy industries are on a production basis requiring the finer types of steels, then we will have more concrete results to report."

The food industry must move forward at a fairly brisk pace no matter how severe curtailment may be in other industries and therefore metallurgists have turned increasing attention to this field. The Globe Stainless Tube Co., Milwaukee, brought out during the year a stainless tube with a highly polished inside surface in lengths up to 28 ft. and designed especially for dairy plants. The company reports that greatly improved polishing methods have been developed and that the tube can be made in a wide range of sizes and with or without a polished outside surface.

A new corrosion and heat resisting seamless tube has been introduced by

Corrosion-Resisting Alloys

SPECIAL attention during the year has been directed to the corrosion resistance of our series of alloys known as Hastelloys. We have used these successfully to withstand wet chlorine gas, ferric chloride and sulphuric and phosphoric acids. One recently developed alloy has been found satisfactory for handling sulphuric acid in all concentrations up to the boiling point. This alloy is readily welded by arc or acetylene methods and can be forged and rolled to make many of the elements required in chemical equipment.

Another recent development is known as J-Metal, a cutting tool alloy. Production records in several plants show that this alloy on the average cast iron or semi-steel machining can be run at a maximum increase in cutting speed of about 50 per cent, with other conditions unaltered.

New uses for Stellite have been developed, among which we may mention automotive exhaust valve seats and inserted valve seats for bus and truck engines. On a test run on a large truck Stellited exhaust valve seats were still operating efficiently, requiring no regrinding, after an equivalent of between 40,000 and 50,000 miles.

Hascrome, a self-hardening chromium-manganese-iron developed previous to 1932 in the form of welding rod for hard surfacing of crusher jaws and similar parts, has now appeared in the form of cast tips to be welded on worn drag line and dipper bucket teeth. Worn tooth shanks are saved by this process at a cost less than that of new teeth and the resulting rebuilt teeth frequently have longer life.

Haynes Stellite Co.,
New York

The nickel-chromium steels came into promi but 1932 was distinguished by a trend toward

Nickel-Clad Plates

ALTHOUGH we, in cooperation with the Lukens Steel Co., Coatesville, Pa., first introduced nickel-clad plates in 1931, they have found their chief practical application during the past year. One of the principal uses has been the construction of tank cars and large tanks for transporting and storing caustic soda for use in the rayon industry. Caustic soda is also used in the silk industry, but minute percentages of alloy in a solution do not interfere with the quality of the silk produced and therefore it is possible to use alloys of the nickel chrome variety. In the case of rayon, however, even minute percentages of metal become objectionable and the use of pure nickel in contact with the caustic soda seems to be the only practical solution. The development of the nickel-clad plates has appreciably reduced the cost of tanks and containers of this variety. These plates are rolled by the Lukens Steel Co. and consist essentially of a standard carbon steel plate which is welded to a thin pure nickel plate during the rolling process. A firm bond is secured, giving the entire plate new properties.

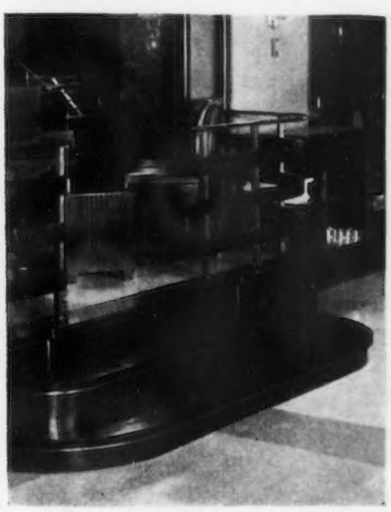
The usual proportional thickness is 10 per cent nickel and 90 per cent steel and with this proportion a plate of a definite thickness—say ½ in.—shows greater strength than a plate of the same thickness of all steel. The material is used for nitriding ovens, certain mercury arc rectifier parts, storage tanks and settling tanks in the chemical industry, and for considerable equipment in the brewery and soap industries.

J. F. McNAMARA,
International Nickel Co.

the National Tube Co., Pittsburgh. This tube is made of an alloy containing approximately 30 per cent chromium. It is said to be successfully used at temperatures up to 2100 deg. F.

The Future Will Demand Much of Alloys

As with carbon steel, greater uniformity and greater accuracy in finishing have characterized the progress in alloys during the year. The Ellwood Ivins' Steel Tube Works, Philadelphia, state that they look forward to a demand for much higher grade material in the future and that preparation to meet this has been made during the past year. This company's report states: "Our aircraft tubes in chrome-molybdenum steel have been recreated by an entirely new process of manufacture. We now make these in a hundred or more different sizes to a tolerance of 0.001 in. with smooth surface inside and outside. We have used to the fullest extent of our ability the dull days of the past year to remodel our products."



nence for building exteriors in 1930 and 1931, the use of nickel alloys for interior decorations.

In an attempt to get better machining alloy, one company found that by adding chromium to an already high chromium alloy casting they could greatly increase its machinability. In one typical example they increased the chromium from 18 per cent to 24 per cent and while they thus sacrificed some properties they secured a readily machinable product.

Manufacturers of chrome vanadium steel have been continually increasing the physical properties of that alloy and the Fixed Nitrogen Research Laboratory of the U. S. Department of Agriculture selected it for the construction of one of the highest pressure compressors made. This had a final discharge pressure of 15,000 lb. per sq. in.

A new use for chromium plating was developed by the Pratt and Whitney Co., Hartford, Conn. Certain parts in the assembly of an airplane engine must have an extremely tight fit and yet the surfaces must not "freeze" together to cause injury when the parts are disassembled, as they frequently must be for inspection. By chromium plating the contact surfaces, any tendency to freeze has been avoided.

Manufacturers of wrought iron have been particularly active during the year and have found successful methods of alloying to secure improved properties. One company reports the development of processes to produce wrought iron alloyed with nickel, with molybdenum, and with copper.

An Alloy for Cracking Stills

OUR research department, seeking alloys for use at elevated temperatures, has developed a number of new materials during the year. An alloy steel has been found which at a considerably lower price gives creep strengths comparable with any of the generally used high temperature steels including the stainless types. This new alloy is suitable for use as tubes in high pressure boilers, superheaters and cracking stills. Its application has now been extended to such materials as bolts, tube ends, and similar articles where corrosion is not a serious factor.

Timken Steel and Tube Co.,
Canton, Ohio

Alloys Feature Castings Progress

◈ ◈ ◈

WHILE changes in the casting industry during 1932 were not startling, the bases of what may well become outstanding future changes in the industry were laid. Some of the developments of most interest occurred in research departments through the country and now await practical tests. Exceedingly important work in the field of alloy castings comes in this category. Depth hardening, better machinability, and shock anneal malleable cycles are some of the chief items which have entered actual production. Most foundries and foundry associations, however, report little or no development, due to the meager demand.

In answer to a request the American Foundrymen's Association sent an inquiry to its members asking, on behalf of THE IRON AGE, for a review of the year's progress and the following quotation is typical of a large number of the replies: "We have nothing to offer at this time, for while we have been taking advantage of the quiet period to improve our product, the progress made has been in processes already well established rather than in any new development." A few of the members reported actual progress, as the following quotations will show:

"WE have been able to show considerable progress in depth hardening in cast iron. Methods and compositions have been established for securing hardness and strength in heavy sections—say from 5-in. to 10-in.—and this permits the successful use of cast iron on jobs which require high strength throughout a heavy cross-section. We believe molybdenum is a necessary constituent of the analysis where this full effect is to be developed."

* * *

"AN item which has received a great deal of attention during the past year is the alloying of white and chilled cast iron. Considerable progress has been made and we look for some very interesting developments in this field."

* * *

"WE have made considerable progress in the field of malleable cast iron. Alloys are beginning to come into the picture here. Last year witnessed some successful work leading to production applications of alloy malleable, especially along the lines of resistance to wear."

* * *

One important development in the foundry industry in 1932 was the adoption by Committee A-3 of the American Society for Testing Materials of a new set of tentative specifications for gray iron castings. These divide all such castings into seven classes based on tensile strength. Test procedures were modified to include test bars of three different diameters and thus permit the iron in the specimen to more nearly approximate the iron in the casting. This is practically a reversal of the previous policy whereby one test bar was used to represent the iron in the ladle.

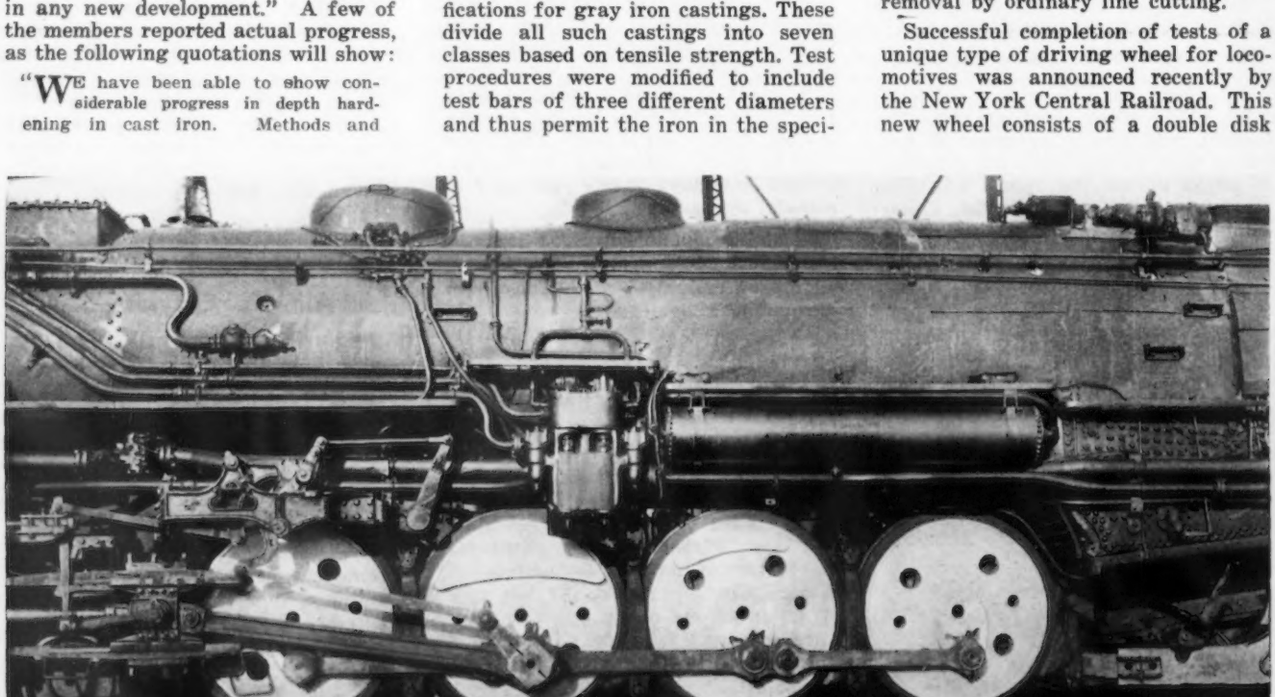
Match Plates Made of Magnesium

Some alert foundrymen have taken advantage of the new lightweight materials to reduce the effort of handling patterns, match plates and flasks. These articles and many others used in the foundry have been successfully made of magnesium. One foundry reports an increased production by its molders, due to lighter weight equipment made of magnesium.

Steel Castings Improve

DURING the past year, the deseaming blowpipe has been increasingly used in the steel foundry for cleaning up cracks and sand holes, for removal of superfluous metal in castings due to defective conditions at the time of pouring, and for the removal of risers and sprues whose location makes it difficult for their removal by ordinary line cutting.

Successful completion of tests of a unique type of driving wheel for locomotives was announced recently by the New York Central Railroad. This new wheel consists of a double disk



This shows New York Central locomotive 2726, the first to be equipped with the new type of disk driving wheels. Besides reducing the cost of manufacture, these wheels give a net saving in weight of more than a ton, which is a desirable feature in current locomotive design. Some years ago, in order to give sufficient traction, added weight of materials was sought in the construction of locomotives, but the increase of power and the rapid expansion of equipment has decidedly altered this feature and reduced weight of elements is now desired. This is particularly the case with drivers where lighter construction reduces the impact of the wheels on the rails.

cast steel center, over which is placed an ordinary locomotive tire. In the conventional design of spoke-type of driving wheel with integral cast counterbalance block, uneven cooling of the complicated section introduces difficulties into the casting procedure. The new type of wheel permits use of a markedly superior design of casting.

There has been an extension this year of the growing impression among producers of steel castings that quality and new properties induced by heat treatment have significance impossible to exaggerate. Constant effort to produce purer and cleaner steels has carried through the year and full heat treatments of the most advanced type are coming to be accepted as common practice among the more successful steel foundries.

Another development which, although not very dramatic nevertheless has far-reaching effect, is the so-called "fit the casting to the job" practice. Carried to its logical conclusion, this practice takes full advantage of the versatility of cast steel from both composition and treatment standpoints and draws extensively upon other materials either in close combination as in welding or as adjacent parts in a complete assembly.

Improved foundry technique has made it possible to economically cast longer and more complicated products. An example is the development of cast one-piece screws used on conveyors by the Chicago Steel Foundry Co. This particular screw has alternating flights eccentric to the shaft.

New Properties for Malleable Castings

BY modifying the analysis of the ladle iron and then adopting an entirely new annealing cycle, some malleable foundries have been able to produce castings with rather startling physical properties. The new cycle is known as a shock anneal and involves repeated rapid heating and cooling. One of the developments in this field is called Z-Metal, sponsored by the Industrial Furnace Corpn. at Buffalo. About ten licensees for this metal are in active production. One, the Chain Belt Co. at Milwaukee, reports malleable Z-Metal castings to have a tensile strength of 54,000 lb. per sq. in. with an elongation of 20 per cent and tensile strengths as high as 80,000 lb. per sq. in. with an elongation of 14 per cent.

Successful technique for welding malleable iron has been achieved. One manufacturer of large power shears has successfully welded a plate of steel to a malleable casting. The Philadelphia Traction Co. reports the welding together of two malleable castings in standard production of equipment on a quantity basis. The Arcade Malleable Iron Co., Worcester, Mass., is regularly spot welding cold rolled sheet steel to malleable castings. In this last case the manufacturer advises that it is necessary to have the thickness of the casting about twice that of the steel in order to obtain satisfactory results. The Indian Motorcycle Co., Springfield, Mass., states: "We are successfully brazing malleable iron to seamless steel tubing to produce a strong, lasting joint."

Partial success has been achieved by the Arcade Malleable Iron Co. in the production of nitrided malleable castings and since difficulties concerning the sand casting of gray iron for nitriding are nearing solution, there is no doubt but that satisfactory castings of this type will be made and marketed in the near future.

Gray Iron Technique Advances

CAST iron possesses many inherent properties which make it a satisfactory material for brakes. It is readily cast to shape, it machines well, and has good wear-resisting properties. It was only necessary to introduce certain alloys to give it additional desired properties. Nickel cast iron of a fine grain structure and carrying a considerable amount of free graphite is performing satisfactorily under the severe conditions demanded of the modern automobile brake drum. The usual design has circumferential ribs to give better cooling and provide greater stiffness.

Machinery designers have focused their attention on the re-designing of castings to give lower cost production, and in so doing, have found that in general the machine part designed for lower casting cost also is designed to give better service. Simplification of design has often eliminated internal stresses and reduced sand inclusions.

Gray iron cylinder liners suitable for nitriding have been cast successfully by the Janney Cylinder Co., Philadelphia. Experimental work is being conducted at the plant of the Hunt-Spiller Mfg. Co., South Boston, to solve the problem of making sand castings of gray iron containing aluminum.

Dr. Homerberg, Massachusetts Institute of Technology, states that a hard case may now be obtained on gray iron castings by nitriding in the same way as forgings and rolled parts are nitrided, provided the casting has the proper composition.

KATHARINE CORNELL in cast nickel chromium steel. Karl Illava, sculptor. Cooper Alloy Foundry Co., maker.

Alloy Castings Show Strength

NEW alloys and new elements have come to the fore in the casting industry. Molybdenum especially has played an important role. The Climax Molybdenum Co., Detroit, reports considerable success in achieving machinability of cast iron at high Brinell hardnesses through the use of additions of molybdenum and nickel. In one case, castings showing a Brinell hardness of approximately 300 are being machined on a production basis and at least one manufacturer of heavy duty motors is using a cast molybdenum iron cylinder block with a minimum hardness of about 240 Brinell. Molybdenum nickel electric furnace iron of 60,000 to 65,000 tensile strength in the cast condition has been developed with good commercial machinability.

This all has led to progress in the casting of such products as camshafts and crankshafts which previously were made of forgings. The research department of the International Nickel Co. reports progress in alloy castings containing nickel. One of these, which is a modification of a previous development, uses a nickel copper chromium alloy addition to ordinary gray iron. The Westinghouse

The Mechanical Side of Mold Making

SLACK times and low manufacturing volume have allowed our research work to carry into the plant more fully than usual. By "research" in this sense I mean a careful or critical examination of our present molding methods, looking forward to continual improvement of the final product. This program has involved first a study of mold design and mold materials to determine the part the mold plays in satisfactory castings, and second, a study of gating and risering methods to determine improvements on the soundness and uniformity of castings. Iron characteristics and melting and pouring temperatures have also been carefully investigated.

We have found that the degree and uniformity of mold hardness are definite factors in iron penetration and resultant cleaning costs. We find that a uniformly hard mold reduces machine costs through elimination of excess stock of finish. This particularly applies to machine molding where there are long draws and where opportunity exists for a soft section in the mold. We find that mold conditions account for many foundry defects which too often are charged to some other factor, most frequently, iron.

All of this of course presupposes a carefully standardized practice as to the sand best suited for the work and refers more to the mechanical side of mold making as related to number of jolts or effectiveness of the jolt.

R. F. HARRINGTON,
Metallurgist Hunt-Spiller Manufacturing Corpn.

Electric & Mfg. Co. reports the extension of the centrifugal method of producing castings to include nickel chromium iron cylinder liners for oil engines. This company also reports progress involving the further addition of molybdenum to its nickel chromium group of alloy iron castings. Special alloy castings have been developed for the construction of conveyors to handle hot flue dust at 1900 deg. F. in cement kilns. Other special steel castings of corrosion resisting type have entered the chemical and paper pulp industries.

A new oxy-acetylene cutting technique has been developed by the Linde Air Products Co. for the removal of risers from chrome-nickel steel castings of the 18 and 8 variety. This technique uses a large nozzle or tip and six preheating jets rather than the usual four. The pressure is increased to about 20 per cent and the operator employs a gentle but speedy up and down motion of the cutting blowpipe. It is claimed that by this technique a skilled operator can sever a 6-in. by 6-in. 18 and 8 chrome nickel steel riser in about three minutes of cutting time, which is hardly more than that required for cutting an ordinary steel riser.

An interesting invasion of alloy castings into the arts is seen in the casting of a life-sized bust of Miss Katharine Cornell by the Cooper Alloy Foundry Co., Elizabeth, N. J. This casting is made of 18 and 8 stainless steel with a polished satin finish and now stands in the lobby of the Belasco Theatre, New York.

The alloy foundry shops of the Westinghouse Electric and Mfg. Co. have entered the ornamental casting field with a new lightweight high tensile alloy, according to Carl G. Schluederberg, Works Manager, Cleveland. This development came about through the need for a cast material suitable for newly designed electrical apparatus. When used for large ornamental castings in architectural work this new alloy resists atmospheric corrosion.

Another company to develop alloy castings is the Lebanon Steel Foundry, Lebanon, Pa., which reports a medium manganese steel casting with high resistance to wear, a chrome molybdenum casting for machine parts requiring high tensile and yield characteristics, and several others.

Non-Ferrous Castings are Diversified

THE Falcon Bronze Co., Youngstown, Ohio, states that new alloys with most impressive qualities have appeared in the non-ferrous field during the year but these in most cases have lacked the practical application which would make more detailed report possible. The Lunkenheimer Co., Cincinnati, calls attention to progress in copper beryllium bronze castings and also copper silicon zinc alloys.

Steel Foundry Progress

ECONOMIC conditions have exerted a controlling influence on progress in the steel castings industry in 1932. In some lines it has aided and in many others it has retarded progress. Two developments, however, are noteworthy: (1) the use of what are commonly termed the low alloy steels, has undergone considerable extension, and (2) a marked effort has been made to bring before the engineering trades the great possibilities in the use of steel castings because of the wide range of properties available and the greater variety of treatments offered.

Design, so vital a factor in industry today, has been stressed as of major importance in the production of satisfactory castings. This effort was epitomized in a set of papers presented at a Symposium on Steel Castings at Atlantic City during the year. To me, the contributions offered at this Symposium present the best all-round presentation of facts made by the steel foundry industry in many years.

DAVID EVANS,
President Chicago Steel Foundry Co.

These are described in greater detail in another section.

In view of the small amount of building generally, non-ferrous castings can be said to have made satisfactory progress in the architectural field. Better methods of manufacture have been devised and the use of the welding torch has cut costs. Formerly it was thought necessary in order to fill architects' specifications to make very large and therefore expensive castings. Recently some companies have been able to produce even better effects and at a substantial saving in cost, through the use of thinner castings in small sections which are later welded together.

The use of non-ferrous welding rods has shown extension during the year. These are used for overlay on steel in repair work and also for joining steel and other metals. A new high strength wear resisting bronze rod is said to join steel and give a welding strength up to 60,000 lb. per sq. in. with ductility around 30 per cent. This same rod has been used successfully in the repair of manganese bronze parts.

Non-Ferrous Metals in the Limelight

NEW alloys and new methods of heat treating have brought the non-ferrous metals into the limelight during the past year. Aluminum is being successfully heat treated to produce new properties. Beryllium has been introduced into several alloys and one of these, known as beryllium copper, is a heat-treatable alloy of great promise. This was exhibited first in the December Power Show in New York where a feature was the use of beryllium copper cold chisel to cut forged steel rivets. The principal advantages claimed for the alloy are high tensile strength, high fatigue limit, hardness and resistance to abrasion. Test specimens under heat treatment have been increased in strength from 108,000 lb. per sq. in. to 190,000 lb. per sq. in., according to a report of the American Brass Co., Waterbury, Conn.

In appearance, beryllium copper closely resembles pure gold, giving it value in architectural and decorative work. In addition it is said to be non-sparking, which makes it well adapted for tools used near explosive materials.

The practice of heat treating aluminum varies under different conditions. One company states that aluminum parts are soaked at a high temperature for a much longer time than would be the case with steel. This report continues: "We quench in oil and then allow the parts to cool slowly over a long period at a temperature of about 300 deg. F. The actual work of heat treating aluminum is no more difficult than in the case of steel, but we believe that success to the person first trying this heat treatment will come only as the many factors have been adjusted by actual experience. We have been able to increase our tensile strength by 40 per cent and to get nearly twice the elongation."

Bronze for Joining Steel

With a high strength wear-resisting bronze welding rod recently placed on the market, it is claimed that welds joining steel can be readily made with strengths up to 60,000 lb. per sq. in. and with ductility in excess of 30 per cent. This rod, together with improvements in bronze welding technique, has greatly extended the use of bronze welding for the repair of broken castings and for the building up of worn surfaces, particularly on steel, cast iron and manganese bronze.

A new thin sheet copper is offered by the American Brass Co. to the building industry for such uses as roofings, pipe wrapping, waterproofing, and decorations. This metal is produced by depositing copper on a rotating cylinder and scraping the cylinder to secure a continuous sheet. The speed of the cylinder determines the thickness of the sheet. To give some idea of the thickness it was stated that one ounce will cover a space 30 in. by 50 in.

Magnesium Developments Outlined

The advance in the magnesium industry during 1932 is covered in an exhaustive report prepared by W. G. Harvey, vice-president, American Magnesium Corpn., Pittsburgh. This is one of the few industries which actually increased in production and in number of outlets. The chief feature has been the development of economical methods of turning this light metal into useful forms. These include die castings, forgings, extruded shapes and rolled sheets. To illustrate the advance, Mr. Harvey points

Nickel Technique Expands

WHILE technical developments and new uses for nickel went ahead by leaps and bounds during the year, the industry as a whole felt the full effects of the depression. Despite this, the nickel business has become one of the basic industries of the world. World consumption of nickel for the first nine months of 1932 exceeded 20,000 tons as against 28,000 tons for the same period in the previous year, and nickel-plating still requires about 5 per cent of all the nickel produced.

In France a new method of plating has been developed which makes use of a hot single sulphate bath operated at high current densities. In France also, a new type of storage battery—a nickel-cadmium alkaline cell—was developed for industrial trucking and train lighting.

The year witnessed increasing diversification of the uses of nickel for miscellaneous purposes. A new interest in powdered metallurgy started and definite economies were effected by combining metals in powdered form, then pressing them in dies and subsequently applying heat-treatment. Some alloys, not possible by melting, thus can be made with powdered metals.

ROBERT C. STANLEY,
President, International Nickel Co. of Canada

New Uses for Cemented Carbides

IN general it may be said that during 1932 those in the metal working industry have given greater recognition to the fact that although the chief benefits from the cemented carbides are obtained under high-speed mass production conditions, nevertheless highly desirable economies can be secured with this material under the conditions which exist today. As a result, the cemented carbides have found a more extensive and more diversified use in many of these plants which have taken advantage of the lull in production to carefully scrutinize existing methods and equipment in order to effect maximum economy.

Cutting Steel

The problem of cutting steel with cemented carbide has been the object of extended research work ever since the introduction of this material in 1928. The latest grades developed specificially for this purpose are composed chiefly of tungsten carbide with, in addition to a suitable binder, a sufficient amount of tantalum carbide to improve the tungsten carbide for steel cutting purposes. At their present stage of development these grades can be used economically and satisfactorily for turning, boring and milling carbon steels classified as S. A. E. 1015 to S. A. E. 1055. Within this range they are being used successfully for commercially machining such parts as forgings and bar stock on engine and turret lathes, automatics, boring mills and milling machines at speeds far beyond the present high-speed steel range.

Although the above represents the present recommended range of use, it is interesting to note that a number of successful applications on nickel, chrome-nickel, chromium and vanadium steels and on close-limit alloy steel forgings, such as used in the automotive industry, indicate that the possibilities are by no means exhausted.

New Applications Developed

Among the applications which have been developed during 1932, using grades for general machining work, are several which are particularly worthy of note because they have created a new, higher order of speed, economy and accuracy—and in some instances have made the operation commercially practical.

A few of the more important of these are the turning of "Centrifuse" brake drums—an operation made commercially practical only through the use of cemented carbide, the finish boring of cylinder barrels, the sawing of horizontal and vertical expansion slots in silicon-aluminum alloy pistons, and the turning of carbon alloy steel and chilled iron rolling mill rolls of brinell hardness up to 578. The longer life of cemented carbide has led to the more extensive use of multiple box tooling with a consequent saving in tool set-up and machining time.

Non-Machining, Wear Resistant Applications

Non-machining, wear resistant applications represent another field which has been more extensively developed during 1932. Because of its extreme hardness cemented carbide is ideally adapted to this type of application. Examples of its use in this field are: Gages, amplifying anvils, burnishing tools, lathe centers, centerless grinder rests, wire guides, indicator points, master cams, nozzles for abrasive materials, solid cemented carbide brinell balls for hardness testing machines and solid piece rollers.

Truing Tools

A truing tool was introduced about the first part of 1932 and has subsequently found a wide range of use on the finish dressing of grinding wheels. The tool consists of a tungsten carbide matrix impregnated with small, crushed diamonds which are distributed uniformly throughout the matrix, providing an ample number of cutting points at each new surface reached. It is used on wheel sizes up to 36 in. in diameter by 6 in. wide and "M" in hardness and on centerless grinding wheel in sizes up to 20 in. diameter by 6 in. wide.

Carboloy Co., Inc.

---

out that a year ago the average unit weight of magnesium sand castings was about 1 lb. This has been increased to at least 3 lb. during the past year. Some magnesium foundries have successfully turned out castings weighing over 150 lb. each. One of the chief outlets of the industry was found in new uses in the manufacture of aircraft. In other fields some of the items made of magnesium are as follows: Motion picture machines, quick oscillating breadslicing equipment, high-speed cutting lathes, portable pneumatic tools, portable typewriters, ticket vending equipment, and machine parts in the textile industry. An interesting use described more fully elsewhere is for patterns, match plates and core boxes in the iron and steel foundry industry.

Again quoting from Mr. Harvey: "Magnesium castings have experimentally entered the low-price automobile field and on the horizon we can just begin to see the possibility of magnesium sand castings selling for approximately the same per piece price as aluminum castings and saving about 30 per cent in weight. Magnesium pressure castings made their first definite advance in 1932. Dies for such castings cost no more than for aluminum and, in quantity, magnesium die castings are cheaper than sand castings of the same metal.

Extruded magnesium structural shapes and rolled sheets are being introduced into the bus and truck field and magnesium forgings have been used for aircraft propellers.

Zinc Alloys for Die Casting

During 1932 the New Jersey Zinc Co. featured its Zamak alloys for die castings and engineers in many fields have accepted these for their new properties, some of which are as follows:

Zamak containing:	Per Cent
Aluminum	4.10
Copper	2.70
Magnesium	0.03
Balance—zinc	
Tensile strength	47,000 lb.
Elongation—2 in.	8.4
Compressive strength	93,000 lb.
Brinell hardness	83
Shearing strength	45,000 lb.

The New Products Conference at Cleveland reported a coloring process for aluminum for which great possibilities were predicted.

Use of Metals for Repairs

Repairing of metal machinery elements has advanced rapidly, due to the necessity for economy. The building up of worn parts by laying on metal with the welding torch and then grinding or machining down to dimension has become common practice. One shop in building up steel parts has found that a brass rod deposited with an oxy-acetylene torch will show ample strength in many cases and that the saving in labor would offset any increase in material cost. Tests of aluminum brass condenser tubes have shown longer life under some service conditions than the usual steel tubes.

The Firth-Sterling Steel Co. has developed a new sintered carbide cutting tool which it claims has a cutting capacity far beyond the original tungsten carbide tools.

Aluminum Finds New Market

CERTAIN phases of the aluminum industry have shown an encouraging increase in consumption over last year's figures and this helps to make up in a measure for losses which the industry has suffered in other directions. The applications for light alloys in transportation continue to widen in scope. This is particularly noticeable in the motor truck field where aluminized carriers now include practically all types of service units, from department store delivery trucks to freight-car-long heavy-duty moving vans. One of the most unusual trucks ever built is an aluminum-bodied dump truck of 50,000 lb. capacity, built for carrying crushed rock. The past year has seen the development of heat treated pressed aluminum frames for trucks and trailer chassis and these are now regularly manufactured to fit any type of carrier.

An outstanding example of the progress of light alloys in the field of railroad transportation is seen in a 42-passenger railcar which has just been built for regular passenger service on main lines. Its total weight is 26,000 lb., which is about one-fourth the weight of a modern steam railroad coach of usual steel construction. Wherever practicable, aluminum alloys were employed in the construction of this car, not only in the body but for structural members as well. The steel rimmed wheels are cushioned with layers of rubber, which, combined with the thoroughly insulated body, make the car practically sound proof and vibrationless while in motion. It is powered with a 16-cylinder gasoline engine and has a cruising speed of approximately 70 miles an hour.

The outstanding development of the year in lighter-than-air transportation is, of course, the dirigible U.S.S. Macon, now nearing completion at Akron. Like the U.S.S. Akron, large quantities of aluminum are being employed in its construction.

Architectural interest for 1932 was centered in New York with the huge project, Rockefeller Center, as the natural cynosure of attention. Twenty-two thousand cast aluminum spandrels will be employed on the various buildings and of these 7500 have already been installed. Aluminum will also be employed for sills, grilles, louvres, marquises and numerous other ornamental parts.

One of the leading refrigerator manufacturers has recently brought out a new model which employs three sheets of aluminum foil with intervening air spaces as an effective wall insulating medium.

Aluminum milk cans are now available in sizes ranging from 1 to 10-gal. capacity, while aluminum foil milk bottle caps which were introduced last year may now be had in color and with printed designs.

The Alumilite process of coloring aluminum has shown encouraging progress. This method, which usually embodies an anodic treatment followed by carefully selected dyes, imparts to the surface of the metal an extremely hard finish which is as serviceable as it is attractive.

Two new aluminum alloys have been developed during the twelve months just concluded. One of these is a high strength duralumin type alloy designed primarily for use where unusual strength and mechanical properties are desired. When used as a core material for aluminum-clad products, it offers a combination of characteristics which include both remarkable strength and excellent resistance to corrosion.

The other alloy was developed to supply an extruded material for use in the manufacture of window frames, sub-frames and sills. It combines excellent resistance to corrosion with good mechanical properties and possesses the advantage of satisfactory formability and attractive color.

GEORGE J. STANLEY
Vice-President, Aluminum Co. of America

New Designs Lower Forging Costs

PROGRESS in the forging industry during the past year lies chiefly in three fields, (1) design of parts to facilitate forging, (2) technique in forging the new alloys, and (3) new shapes and properties in forging bars.

The design of forgings has been attacked from a new angle. Instead of designing a part solely for its use in a complete machine, forgings have been designed for greater ease and efficiency in manufacture. Some of the features considered have been uniform distribution of heat in the heat treatment following forging, lower cost of die construction, longer life of dies, and the use of multiple dies and automatic forging presses. As an example of the new trend in manufacture, one forge shop has been successful in fashioning two or more parts as one forging and then sawing these apart with a high-speed metal-cutting saw as a subsequent operation.

One of the outstanding developments in design of equipment was the completion of an automatic forging press by the Erie Foundry Co., Erie, Pa. In this new press, according to a company statement, provision is made for working the stock progressively in several impressions, but the feeding of the stock through the press is automatic so that a finished forging, or, in the case of multiple dies, a number of forgings in a strip are completed and ejected from the press at each stroke.

Nearly all the earlier difficulties in forging the stainless steel alloys have been overcome by careful attention to detail. One company reports that the chief difference between handling ordinary steels and stainless steels is a jump in temperature from 1400 deg. F. to 1700 deg. F. and an increase in accuracy in temperature regulation. Another company states that its chief concern is to keep the temperature range accurate. For K A 2 steels this company holds the temperature between 2350 deg. F. and 2375 deg. F. The western forge plant of General Metals Corpn., Los Angeles, has made a special study of forging the various new alloy steels and reports success in all of these. The Westinghouse Electric and Mfg. Co. states that forged stainless steel has replaced nickel-copper castings for nozzle blocks in turbines and a nickel-chromium-molybdenum steel forging is now used for large forgings up to 38,-

000 lb. finished weight and 80 in. maximum diameter. These forgings develop a tensile strength of 100,000 lb. per sq. in. without recourse to quenching in the heat treatment.

Many forge shops, under the necessity of reducing expenses to the limit, have shifted some of their troubles to the steel mill by demanding forging bars of special shapes to reduce the amount of movement of metal under the first breakdown operation. For the most part, steel companies have cooperated and bars of new cross sections have appeared. One of these with a cross section of a modified pear shape has reduced the expense of forging axe and hatchet heads. Instead of buying bars in random lengths, shops are turning more and more to the specified length bar to save material.. The usual practice seems to be to specify lengths on bars 1½ in. in diameter and larger and to buy random lengths in smaller sizes.

Die Castings and Stampings

A RECENT trend in die castings has been toward the use of metals with higher physical properties. More brass is being used and new alloys containing brass and aluminum and nickel have been successfully tried. The Aurora Metal Co., Aurora, Ill., has discovered a new method of die casting with a silicon bronze alloy which it states has a tensile strength of over 80,000 lb. per sq. in. This company reports that pump impellers of the enclosed type, made of this alloy, come from the dies in such shape that they require little or no finishing. In the die casting process the sand cores are maintained positively in their proper positions, according to the report. The silicon bronze not only has been found to have high strength but is said to be resistant to corrosion, abrasion and fatigue.

The Doehler Die Casting Co., New York, reports marked progress in the use of thin wall sections in its zinc and aluminum die castings. Zinc is being cast with walls 0.035 in. thick, and aluminum with walls 0.055 in. thick. This new technique, the company states, has opened up many additional fields for die castings. Another company reports improved technique in die casting due to the use of a vertical parting plane instead of a horizontal parting plane.

Better Material for Stampings

Manufacturers of stampings and punchings are modest in their claims for 1932 progress. Most companies state that depression conditions have prevented any marked development. One company reports that the rolling mills have greatly improved the quality of steel intended for stampings. The Worcester Pressed Steel Co., Worcester, Mass., has improved its technique of rolling 18 and 8 alloy steel strip. Part of this technique includes the electric heating of rolls used in the so-called cold rolled process. The range oil burner industry has been active during the depression because the product has an economy appeal. These burners are made of stainless steel and several companies have developed new methods of high-speed perforation in this connection. Charles Mundt & Sons, Jersey City, have installed a special roller leveling machine to enable them to finish perfectly flat perforated sheets with blank margins. The company states that heretofore this was impossible as the operation of perforating sheets with blank margins required that the metal stretch where the perforating occurred and did not stretch at the margin. The new type of roller is said to completely overcome this difficulty.

Brazing for Cemented Carbide Tools

OUR chief development in the field of cemented carbide tools is a patented brazing process which we call the Z-Foil Process. Our tests show that this process produces a bond between the cemented carbide and the steel shank several times stronger than that produced by the usual method of copper brazing in the muffle or hydrogen furnace. An advantage of this new process is the elimination of dovetailing of the tip for many applications. We have found that we can braze by this process cemented carbide tips to any type of steel. Tools which cut in several directions can now be designed without the steel backing formerly used to prevent slipping. An additional feature is the fact that heat generated in cutting is more rapidly dissipated into the shank with this new type of joint, so that the tip remains cooler.

Thos. Prosser & Son.

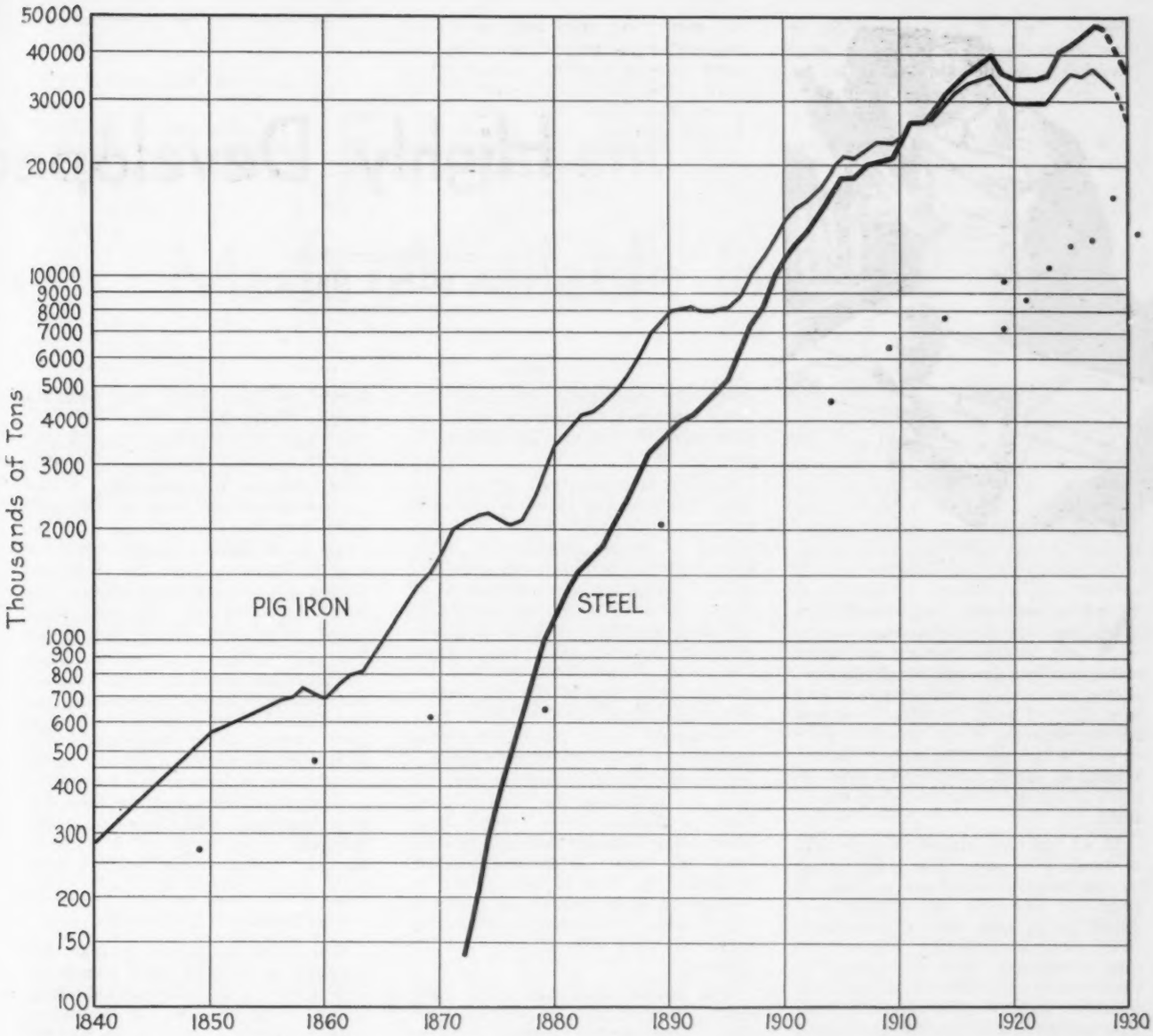
Change a Material and Mayhap an Industry

BEFORE the development of the tungsten carbide cutting materials with their capacity for rapid cutting and long life under high temperature, the weak link in the chain of many machining operations was the cutting tool. With the introduction of the new material the machine itself became the weak link. It had insufficient power and speed to reach the full capacity of the cutting tool and insufficient rigidity to prevent the new brittle material from cracking. Machine tool builders at once tackled the problem and brought out massive and powerful machines which in a measure corrected the difficulty. Then the manufacturers of the tungsten carbide alloys increased the resistance to crumbling of their materials and devised better methods of cementing tips to tool steel shanks, and this again altered conditions back of machine tool design by making lighter construction possible and by increasing the range of operations.

Better Methods for Producing Machine Elements

WHILE some of the advances in the manufacture of machine parts have been described under different headings in previous sections, certain specific improvements in elements such as bolts, bearings, and gears are worthy of additional comment. The research departments of the bearing manufacturers in particular have been active. Walter M. Nones, president, Norma-Hoffmann Bearings Corpn., Stamford, Conn., says that his company has added many new types and sizes of both ball and roller bearings. He states further: "During this year, with the plant in slow motion, we have taken the opportunity to give our methods and processes careful, critical study with resultant improvement in manufacturing technique all down the line."

New types of bearings, changes in gears, bolts and fastenings, and many similar improvements will be described in the conclusion of this article in a succeeding issue of The IRON AGE.



Seventy-four Years of Pig Iron and 58 Years of Steel

BOTH the curves of this chart were plotted from five-year averages centered about each year, thus to secure a smoothness which would indicate trends.

The curve for pig iron is particularly interesting for the periodic breathing spells of four or five years indicated. For example, in the middle seventies, there is a sidewise movement and again in the eighteen-nineties, while since the Great War an exaggerated sidewise movement is discernible.

In the 12-year period beginning with 1860 expansion was a fairly steady one, with the output in 1872, 325 per cent of that of 1860.

Similarly in the 13 years of 1877-1890, expansion continued at the same rate, a fact which the use of the ratio or logarithmic type of chart brings out; the annual production at the end of the period was of the order of 8,100,000 tons, or again 325 per cent of that of the 2,500,000 tons of 1877.

From 1894 to 1905, 11 years, a somewhat equal rate of expansion is indicated, until in the last of those years production was of the order of 22,000,000 tons, against 8,000,000 tons at the beginning, or 275 per cent more. From 1906, with 22,000,000 tons, to 1918, with 37,000,000 tons, the ratio was 168 per cent.

As to the steel curve, which is of ingots and castings combined, there is no special marking of resting periods, but rather a gradual tapering of the rate of expansion even from the beginnings of steel as a commodity of consequence, or since 1870.

The check in expansion of demand for the 12 years since 1918 is evident in the case of both pig iron and steel, with a clear indication that a major interruption occurred to expansion at about the cessation of the war.

Highly Developed Pr

By RALPH E. MILLER

NEW equipment introduced during 1932 for machining, stamping, forging, welding, and other metal working operations shows continued advances in productiveness and in quality of work. In this, it carried on the progress of the previous year or two, which period is widely characterized as outstanding for its development of highly productive shop equipment.

If, as has been stated, "the thought of those who earn their daily bread by the manufacturing arts is that an improved technique can still be produced which will earn a reasonable profit from a materially reduced volume of business," then the interest in the better equipment and methods now available should under present business conditions be more keen than ever.

Machine Tools Use Cemented Carbides

In machine tools, many of the year's announcements emphasized construction that permits use of cemented-carbide and the new high-speed steel cutting tools with maximum effectiveness. There is a continued trend toward greater rigidity, increased power input and wider speed and feed ranges, as well as toward simplified control and increased flexibility. Convenient change-over to accommodate changes in product design as well as changes in materials has also been a feature of many designs.

Machines are heavier. In cast structures, high-strength irons and semi-steel are being more widely used, and wall sections and the ribbing are such as to better resist deflection. Welded steel construction is used by some builders for some parts; among other advantages, this construction is claimed to provide increased rigidity. In several cases carriage guides are fitted with nitrided or other hardened steel strips. Heat-treated alloy steel spindles, shafts and gears are now commonly employed. At least two large machines brought out last year have nitrided steel spindles running in steel bushes.

Anti-friction bearings are increasingly applied, and in some machines are used throughout. Automatic lubrication, of major importance in the more powerful and high-speed machine tools of today, features machines of all classes. The oiling systems include filters, and reservoirs designed to assure availability of cool oil. In some cases the oiling is arranged so that the machine will stop if for any reason the system should fail to function.

In motor drives, motors of higher horsepower than even a few years ago are employed. Individual motors are used for actuating the various functions of machine tools, greater flexibility being obtained thereby. In some cases the motor is direct-connected; in others the drive is through flat or V-belts or silent chain and sprocket. The number of machines employing hydraulic feed and control has increased.

The number of improved or redesigned machine tools brought out compares favorably with that of other years, notwithstanding the extremely adverse business conditions. Of the large number, only a comparatively few are mentioned in the following paragraphs. These, it is hoped, will serve to indicate concretely the present high status of tools of various classes.

Lathes Have Higher Speeds

NEW lathes include several large machines capable of heavy-duty work with the newer high-speed cutting tools. Two of them were roll lathes of unusual capacity.

An outstanding lathe of special design was the 100-hp. 22-in. swing machine built primarily for determining the maximum metal cutting capacity of cemented-carbide tools. This lathe has 140 spindle speeds, from 33 to 1200 r.p.m. and 100 rates of feed, from 1¼ to 43½ in. per min. The feed mechanism, driven by an individual motor, is entirely separate from and independent of the lathe spindle. Chip removal is by means of a motor-driven conveyor designed to handle 15 cu. ft. per min. A chip breaker is provided to deflect and break up the chips. The machine weighs 40,000 lb.

An 80-in. by 92-ft. high speed roughing lathe having three front and three rear carriages and employing a 350-hp. variable-speed motor for the main drive was also brought out. The tail stock is of off-set construction and may be traversed past the front carriages. An electric motor within each apron provides for feed and rapid power adjustment. The weight of this lathe is 170 tons.

The same company introduced a heavy-duty "express" lathe said to remove metal at the rate of 2½ tons an hour, when using tungsten-carbide tools. The drive is by a 150-190 direct-coupled variable-speed motor. There are two carriages, and six tools can be operated simultaneously. The machine is equipped with a 43-in. diameter faceplate and has a bed 48-ft. long, and weighs 45 tons.

Roll Lathes of Unusual Capacity

Roll lathes announced in 1932 have strength and speed that permit effective use of cemented-carbide tools. One of them features the turning of necks and body at one set-up. The roll as it comes from the foundry is centered on the end opposite the sink head while the sink head is held in a chuck. The necks and body are then machined, and the sink head is finally cut off. There are two carriages. Tungsten-carbide tools 4-in. wide, one in each carriage, have been used. Chilled-iron roll bodies of 58-61 Scleroscope hardness are turned at a speed of 30 ft. per min, with ⅛-in. depth of cut and 3/16-in. longitudinal feed. In turning the necks with high-speed tools, speeds ranging from 9-12 ft. per min. to 24-30 ft. per min., according to the hardness of the material, are said to have been used.

For turning and dressing very large rolls another company brought out a lathe which, although nominally a 70-in. machine, will take rolls 82 in. in diameter and 26 ft. long. With slight modifications of tool equipment, the lathe will swing grooved or straight rolls 88 in. in diameter. The machine is of massive construction, the bedplate alone weighing 134,000 lb. Roller bearings are used throughout and lubrication is automatic.

In rapid production lathes, one new

Production Equipment Made Available in 1932

heavy-duty unit has spindle speeds from 150 to 2400 r.p.m. Speeds up to 600 r.p.m. are obtained through helical back gears and the higher speeds through a direct drive to the spindle The spindle is mounted on Timken bearings, is unusually large but is made shorter than usual to prevent deflection under heaviest cuts. The drive is by a 25-hp. motor through a six-sheave V-belt drive. The bed is equipped with nitrided ways, which are lubricated automatically. All feed gears are in the headstock; they are mounted in Timken bearings. An automatic length stop is provided, and the taper attachment is of new design.

Automatic Lathes Feature Flexibility

Automatic hydro-electric equipment controls the starting and stopping of the spindle and slides of a new automatic lathe. There is no clutch. A variable-speed motor drives the spindle direct through multiple V-belts. The spindle rotates clockwise, or opposite that of the conventional lathe; this, with the arrangement of front and rear carriages, places the full load on the lathe bed. Feed dials are provided for regulating the feed rate of each carriage.

Weighing 8700 lb., a new automatic lathe developed for short, stubby work that can be held either on an arbor or in a chuck is unusually heavy. Speeds up to 2000 r.p.m. are obtainable. A hydraulically-operated work-loading device can be furnished; with this device operation of the machine is fully automatic and continuous. Anti-friction bearings used throughout. A large removable chip truck with provision for separating the work from the chips is a feature.

The same company has developed automatic work-loading and unloading equipment applicable to a group of machines that operate in sequence. In the installation described in THE IRON AGE of June 2, it was arranged for simultaneously loading and unloading three machines installed side by side and used for centering, and rough and finish turning and facing steering-gear sector shafts. The various movements are actuated hydraulically, as are the tailstock spindles of the various machines. Similar automatic loading devices can be supplied, it is stated; for longer sequences of operations.

Duplex multiple-spindle chucking machines in which all tools and chucks can revolve simultaneously were brought out. Various combinations of revolving and stationary tools and chucks can be had. The principle of revolving both the tool and the work is an advantage in certain extremely accurate machining jobs, especially those having deep holes to be drilled and bored true and concentric. When finish turning is to be done, being able to lock a particular spindle while the others turn is especially effective.

High-Speed Screw Machines

Increase in number of simultaneous multiple operations and in speed of production features a new line of six-spindle automatic bar machines. There is an auxiliary turret with independent control of accelerated tool spindles, which may be operated either as stationary or revolving spindle. Two double top slides can be furnished; with these, the main tool turret and auxiliary turret, the machine has 18 tool positions. Hardened helical gears are employed, and lubrication is by a force feed system.

High-spindle speeds, with faster indexing, and heavier construction continue to feature new automatic screw machines. In the case of a ⅞-in. multiple-spindle unit recently announced, speeds up to 2580 r.p.m. are obtainable. Spindles are mounted in anti-friction bearings, which, with the carrier bearings, are oiled automatically. Gear box shafts are also mounted in anti-friction bearings, and

all high-speed gears are of helical type. A recording instrument called the Chronolog, also a new development, is supplied with the machine as standard equipment. It furnishes a continuous record of the machine operation both in visual and tabulated printed form, and, in showing the cause and duration of all idle time, it aids in eliminating production leaks. A number of advantages are claimed for the device, which may be applied to a variety of production equipment.

Drills Highly Developed

MACHINES for drilling and boring have reached a high state of development. Application of the hydraulic principle continues and several interesting specially arranged high-production units were furnished for automotive and other shops. Radial drills that combine increased power and speed are also available.

Flexibility that adapts the machine for a wide range of work featured several new designs. For fixed-center multiple drilling, one company introduced a hydraulically-fed machine, an important feature of which is that various cluster boxes can be easily interchanged to suit individual jobs. Control is centered in a single foot treadle, leaving the operators hands free to handle the work.

Flexibility is also provided in a new production drilling machine intended for single-purpose continuous operation. When changes in product or material require a change in feed or speed, it is merely necessary to transpose gears and any one of 16 speeds, from 263 to 1234 r.p.m., or 16 feeds, from 0.004 to 0.025 in. is quickly available. This machine has capacity for drilling holes up to 1½ in. in steel. Roller bearings are provided for the drive shaft and ball bearings for the drive to the spindle. The spindle rotates in Timken bearings.

Sensitive drilling machines with hydraulic feed have been made available. Either a continuous or a step-by-step control can be supplied for the hydraulic feed. Rate of feed is adjustable from 0 to 40 in. per min. Rapid approach and return are provided, and the feed mechanism stops at the end of each cycle.

A station-type hydraulically-fed multiple drilling machine having six

stations and eight drilling heads was furnished for performing a total of 132 drilling and countersinking operations on a motor block. Of the six stations, four are working stations, and two are for loading and unloading. Of the eight drilling heads four are vertical and four horizontal. Production is at the rate of 75 motor blocks an hour. The machine may also be furnished with three or with eight stations. Drill heads are of new quick-change type. Spindles are mounted in roller bearings and are provided with nose adjustment.

Horizontal oil-feed way-type machines featuring a simplicity that facilitates changeover to new production designs were introduced. Each end of the machine has an individual oil feed unit, thus eliminating the need for equalizing devices between the heads. Each machine has an automatic cycle, started by a foot treadle at the front.

Radial Drill Has Welded Base

A 22-in. column radial drill designed for the heaviest work for which machines of this type are adapted, taking into consideration use of cemented carbide tools, was an interesting new development. A wide range of speeds is available. The base is of welded steel; the top is made from a 3-in. plate and has T-slots planed in it. A heavier plate welded to the bottom completes the box section. Ribs are welded to the plates. Cutting lubricant equipment, electro-hydraulic column binder and power rapid traverse for the head can be furnished. An adjustable-speed motor drive with rheostat control can be supplied. The machine is equipped with ball bearings throughout.

Another company announced a line of 9-in. and 11-in. column radials with 3 or 4-ft. arms featuring a spindle driven direct at high speeds, without gearing, by a four-speed motor. This permits the head to be of simple construction and provides for sensitive operation. Instantaneous speed change is possible through drum control on the head. On the 11-in. column machine, eight speeds are available through back gearing, in addition to the four motor speeds. The total range may be from 28 to 1200 r.p.m. The 9-in. radial has speeds from 60 to 1200 r.p.m., but can be supplied without back gears for operation at speeds of 900, 1200, 1800 and 3600 r.p.m. For machines to be used more for tapping than for drilling a special motor enables as many as 50 reversals a minute to be made.

Precision Boring Machines

Rapid production as well as accuracy and fine finish are obtainable with several new precision boring machines, which are available in single and double-end types, with one or more spindles. Either cemented-carbide or diamond tools are employed, and operation is automatic. Compact and rigid construction feature all designs, and use is made of the hydraulic principle for feed of heads or table or for other functions.

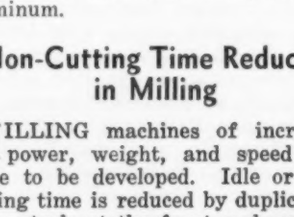
In large boring machines, a special unit for boring and facing at one setting, the cylinders and guides of large engine and booster pump units is believed to be the largest of its type. Cylinders up to 96 in. in diameter can be faced, and work 22 ft. long can be handled. The boring bar, which is 12 in. in diameter and 43 ft. 8 in. long, is supported by two heads, one of which is stationary and serves as a driving unit and the other is adjustable on the bed. The machine weighs 162,000 lb.

In horizontal boring, drilling and milling machines, one company brought out a 5-in. spindle machine having increased cross adjustment and vertical capacity. All sizes of boring, drilling and milling machines made by this company can now be equipped with an auxiliary high-speed drive to the main spindle. With this drive the 3-in. spindle machine has a speed range of 13½ to 1200 r.p.m.; the 4-in. spindle machine, 9 to 1000 r.p.m., and the 5-in. spindle machine, 7½ to 860 r.p.m. These speeds permit use of a ¼-in. drill at 80 ft. per min., or boring and facing heads up to 30 in. in diameter at 60 ft. per min. for cast iron. Cutting speeds up to 300 ft. per min. can be employed when using cemented-carbide on cast iron, and up to 1000 ft. per min. when using them on aluminum.

Non-Cutting Time Reduced in Milling

MILLING machines of increased power, weight, and speed continue to be developed. Idle or non-cutting time is reduced by duplicating the controls at the front and rear, by power fast travel in all directions, and by providing more automatic features. Record size planer-type millers have been built.

One new line of column-and-knee type horizontal machines has 32 spindle speeds from 20 to 1300 r.p.m. and 32 feeds from ½ to 62 in. per min., permitting better performance with high-speed steel cutters and full use of cemented carbide. A wide range of back gear speeds, 16 changes to 238 r.p.m. is available Dual front and rear controls, and power fast travel in all directions are provided. Selection of speeds and feeds has been much simplified.



Hydraulically-actuated machines include a production miller having hydraulic feeds for the headstock as well as the table. In addition to flexibility, this machine features compactness and centralized one-lever control. Although control of the feed rate may be predetermined and automatically actuated, the operator can change it at will by keeping his hand on the centralized control lever, which is dually applied. Direction and speed of movement of either headstock or table is governed by the direction and amount of movement of the control lever. With one type of headstock, two series of selective type spindle speed changes are obtainable. One series gives 18 changes from 32 to 1200 r.p.m., and the second series affords nine additional changes, ranging from 300 to 1800 r.p.m. Feeds, infinite in number, range from 0 to 40 in.

Vertical Operates at High Speeds

A new vertical milling machine having speeds up to 1800 r.p.m., employs an individual motor for driving the spindle and a second motor for the table and spindle feeds. Dual operating control and power fast travel in all directions are provided.

A milling machine with fully universal spindle head, sliding head and motor driven table has been developed. The universal head is designed for driving small cutters at high speeds on tool, die, mold and pattern work. Both swivels of the spindle head can be revolved through 360-deg. in either direction. The sliding head gives wide range and great flexibility; it makes possible a cross-feed equal to the longitudinal feed of the table. Spindle speeds up to 1800 r.p.m. permit use of small tools for work commonly performed with high-speed attachments.

A rotary-type vertical miller having a constantly revolving table was brought out for high-production in such operations as face, side and straddle milling slotting, form cutting and finishing radial faces. The 36-in. diameter table has 18 feed changes and a feed ratio of 40 to 1, which permits full benefits from cemented carbide cutters. The table can be fed at the selected rate through the cut and then rapid traversed to bring the next station to the cutters, after which the normal feed is again engaged. Single or double-spindle heads and special heads can be furnished.

Carrying cuts can be taken without special cutters or attachments on a new universal die sinker equipped with an oscillating head. This changes a difficult hand operation into a quick machine operation and eliminates the need of expensive cutters. It lowers the cost of machining dies and reduces the hand work required on them. A number of operations that are impos-

sible with the ordinary die sinker can be performed.

Record Size Planer-Type Millers

Planer type millers of impressive size were built during the year. One of these, of adjustable-rail type, has capacity for castings 11-ft. high, 15 ft. wide and 40 ft. long. It weighs 275 tons. It has four heads, two vertical, on the rail, and one, horizontal, on each housing. Each head is driven by its own motor. All controls are centralized in two panels, and a pendant switch permits the operator to start, stop or jog the machine while standing at either side or on top of the table.

Another gigantic machine of similar type takes work 16 ft. wide and 16½ ft. high. It weighs 350 tons. Each of the four milling heads has two separate motors, one for the drive and one for the feed and rapid movement. Two planing tool heads are also provided. By means of remote control push-button stations, the operator can control every movement of the machine from six different panel stations. Instruments that indicate the functioning of the entire oiling system are provided at every station.

Grinding Machines of Improved Design

GRINDING machines of improved construction were well represented in the year's developments. They ranged in size from small to very large, and most of them are hydraulically operated. In point of number, surface and internal grinders perhaps predominated.

Powered with a 75-hp. spindle driving motor, a new 26-in. heavy-duty vertical surface grinder is impressive for its power as well as for its ruggedness and flexibility. The weight of this machine, without motors, is 18 tons. Hydraulic power actuates the table and the wheel feed. The table has a working surface of 18 x 88 in. and its maximum travel is 104 in. Table speeds range from 30 to 175 ft. per min., and any speed within the range is instantly available by moving a lever on a graduated chart. Adjustable dogs control the length of table stroke.

Three wheel heads are provided on a center-column type rotary surface grinder, the revolving table of which is designed to receive various fixtures, including rotary magnetic chucks. The three wheel heads permit taking roughing, semi-finishing and finishing cuts without removing the piece from the fixture. Each wheel is 18 in. in diameter and is driven by a 15-hp. motor at a speed of 5400 ft. per min. The machine, without fixtures, weighs 22,000 lb.

For single-surface grinding of work that may be passed beneath two abrasive members, another company brought out a line of duplex vertical surface grinders. The first wheel removes the major portion of the stock while the second wheel corrects any inaccuracies and produces a finished surface. Two automatic air-operated calipers control the accuracy of the grinding. A revolving table with a stationary shaft permits use of a subtable or fixture body in which all the fixture-operating mechanism is inclosed in an oil-tight compartment. The two vertical spindles to which the abrasive members are attached are mounted in individual columns. Each column is self-contained and is equipped with both manual and automatic means for raising and lowering the spindle to compensate for wheel wear.

Internal Grinders for Small and Large Work

In internal grinders, a new machine for small work features smooth operation, fast automatic grinding cycle, and high wheel and work speeds, which, with suitable cross-feed and hydraulic table traverse, give high production and close accuracy. The machine can be equipped with automatic sizing devices. The work-head and work, rather than the wheel-head and wheel, reciprocate with the main table. This permits the entire machine to be driven by one single-end motor, which has a number of advantages for a machine of this size. The stationary wheel-head permits speeds up to 45,000 r.p.m.

Another hydraulically-operated internal grinder features simplicity and flexibility as well as accuracy and convenient operation. Offered for short-run work of a variety of types and sizes, the capacity is for straight and taper holes up to 8 in. in diameter, 8 in. long. The work reciprocates instead of the wheel, an arrangement said not only to simplify application of the motor drive but to permit use of a heavier table and wider spread of ways. The hydraulic system is of low-pressure type. Table traverse is controlled automatically by adjustable dogs, and can be reversed by hand at any point of the stroke.

An internal grinder of vertical type for large work, particularly parts that would be awkward to handle in a horizontal position or for work that would have too great an overhang was another development. It will grind straight or taper internally or externally and can be used for face grinding. The vertical wheel-head slide is operated hydraulically and is counterbalanced hydraulically to provide a uniform slide speed at any throttle opening. The machine can be equipped with size control for continuous production. In each size of the machine, 36 and 48 in., five different column heights are available, and both machines can be furnished either with a 22 or 31-in. grinding stroke. With the 36-in. faceplate the machine weighs approximately 15 tons.

A number of machines designed especially for grinding and lapping cemented-carbide tipped tools were introduced. These included a compact machine having an inbuilt 3600-r.p.m. motor with double shaft projection on one end of which carries a grinding wheel and the other a lapping disk. Several machines for rapid reconditioning of saw blades of various types, especially hacksaw blades, were also announced.

Better Abrasives Available

IMPROVEMENTS in abrasives for grinding, polishing and lapping continues. These have been in the nature of further refinements that embrace not only closer control of size, shape and other properties of the grain to suit different classes of service, but also in some cases the varying of the crystal structure of the grain itself to give maximum cutting efficiency. Five types of grinding wheel bond are now used—namely vitreous, shellac, rubber, silicate and synthetic resin. The synthetic resin bond, first used for high-speed snagging wheels, is being more widely employed, and coping wheels and cam grinding wheels bonded with this material are now available. A Cork-Bakelite wheel is made for producing a high finish on rolls and ball races and rubber bonded wheels are obtainable for snagging and cutting-off operations.

Abrasive disks with a steel-plate backing have been brought out. In one recently announced, the abrasive is perforated to permit the grindings to escape, thus making for free cutting action. This wheel is bonded with a Bakelite resinoid and firmly attached to the steel backing plate by a special cement. Wheels and disks consisting of an abrasive member securely cemented to a thin metal back have been developed for use on disk grinding machines. These are adapted for application where the side of the wheel is used as the grinding surface.

Solid grinding wheels capable of producing a finish closely approaching lapping with a compound are obtainable. These wheels are intended to be used after a series of progressively fine wheels have prepared the work for the final finishing.

Mounted abrasive wheels, points, pencils, buttons and other special shapes for use in connection with high-speed portable grinding machines

have been made available. One line of these, introduced this year, comprises 100 different shapes. Several of these tools are made of an abrasive developed expressly for die work. Vitreous bonds are employed in most cases, but there are Bakelite bonded points and wheels for specific purposes.

Polishing abrasives with specially-treated grain to meet a wide range of service conditions are now regularly available. Increase in lapping, both hand and machine, has been accompanied by the development of softer and finer abrasives, and of ready-mixed compounds, the ingredients of which are proportioned to assure proper abrasive action. A new line of buffing powders that includes material especially adapted for chromium plated parts and for stainless steel and iron has been announced.

Advances Made in Automatic Polishing Equipment

TEN or more automatic polishing machines of straight-line, rotary table and other types were brought out during the year. These included two machines designed especially for polishing stainless and other steel sheets.

One straight-line type machine with 12 heads finishes the top and inside edge of the hinge of automobile hood ventilator doors at the rate of 900 an hour in one pass through the machine. The pieces are 12 in. long by 4 in. wide. A caterpillar type conveyor is used. Automatic devices feed composition paste to the polishing and buffing wheels by means of compressed air.

Automobile bumpers of high-curve, straight and edge bent types are polished automatically on another machine. A uniform finish is obtained without reversing the bumpers in the machine. Severe wear of wheels when passing up the curved surface of the work is eliminated by a new arrangement. Operation is continuous and one man can handle two machines.

An automatic polishing machine with four or five heads, each mounted on a column and individually motor driven, and an indexing table having 12 spindles each of which has an automatic expanding chuck and will take pieces up to 12 in. in diameter, was brought out. The work table, driven by a four-speed motor, rotates intermittently, and its dwell can be adjusted to suit requirements.

Another rotary type automatic machine having four or more spindles handles round, flat or beveled work by the use of simple adaptors. The table may have indexing, continuous or reciprocating motions or a combination of the three. The motor driven heads can be equipped with variable-speed arrangement. Automatic composition feeders can be supplied buffing wheels.

For polishing off the flash left after the welding of a steel automobile hub, a special continuous feed machine has been developed. The work carriages have a caterpillar type feed, and the carriage spindles are rotated by means of chain and sprocket as they go into the working position. The spindles are equipped with chucks that grip the work automatically. The machine can be arranged to swivel the polishing units automatically to time with the feed of the carriages, in order to enter deeper cavities in the contour of the piece.

Stainless Sheets Polished Rapidly

The machines for polishing stainless steel sheets included one employing a flexible abrasive belt over 40 ft. long. The belt runs around contact rolls, and provision is made for applying heavy pressure. Limiting the cutting member to a short contact belt traveling rapidly over the surface of the steel sheet is said to make for efficient cutting action without generating undue heat. The water cooled table carries away whatever heat is generated, making it possible to take unusually heavy cuts without danger of burning the sheet.

Stainless steel sheets up to 60 in. wide, 144 in. long or longer are polished to a commercial finish in one pass under the multiple number of polishing belts employed in another machine. These belts are 7 in. wide and 8 ft. long and are endless. Each one operates over two end pulleys, the inside one of which is direct driven by a 10-hp. motor. This is a self-adjusting feature that produces a uniform pressure over the entire working face of the polishing belt. Sheets placed end to end on the endless belt conveyor pass under the roughing and finishing belts at a constant speed and are polished to the extreme edges.

In recognition of the trend toward employment of polishing after grinding a maker of grinding machines has developed a fully-automatic machine for polishing valve tappets and other small parts. Valve tappet stems are polished at the rate of 40 to 50 per min., about 0.0002-in. stock being removed. The operator does nothing but place the valve stems in the work-holding turret. Wheel carriage reciprocation, indexing of the work turret and other functions of the machine are automatic. Finished pieces drop from the turret into a chute.

New Gear Generators Cut Production Time

IN common with most other classes of machine tools, gear cutting machinery has been improved to give higher output and greater accuracy. New gear generators were announced, and several gear burnishers and other finishing machines were introduced. Devices designed to facilitate inspection were also brought out.

A new large generator adapted for cutting herringbone gears such as used in the steel industry has capacity for work up to 22 ft. in diameter and 60-in. face width. Pinions of relatively small diameter may also be cut. An exceptionally large and heavy indexing mechanism is provided, and the relief mechanism is of markedly improved type. Rigid construction permits a taking of heavier cuts; lowering of cutting time by as much as 40 per cent is claimed. The machine weighs 120 tons.

New bevel gear generators included a spiral bevel unit that operates at much higher speeds and feeds. It has an improved type of cutter cradle, new reversing and indexing mechanisms that are free from vibration and noise, and a straight line movement of the work into the cutter. The latter, a new feature, materially reduces the time required for indexing.

Rough cutting of spiral bevel gears in less than half the time formerly required is accomplished on another machine brought out by the same company. This marked increase in production is obtained by higher speeds and feeds and reduced chucking time. The machine has capacity for gears up to 5½-in. cone distance, 8 to 1 ratio, 11-in. pitch diameter.

Differential gears and pinions are both rough and finish cut on a "completing" machine recently introduced. Doing the two operations on the one machine, instead of on two as heretofore, results in a number of advantages, including decrease in labor cost, in cutter and tool cost, in floor space and in maintenance. Blanks are placed on the spindle at the loading station while the machine is in production at the other two stations. Roughing is accomplished with an inserted formed-blade cutter, while finishing is done by the generating method, using two reciprocating tools. A blank is loaded manually on the spindle at the loading station, secured in place automatically. It is then advanced by the turret to the roughing station, to an intermediate station and next to the finishing station, and finally to the loading station where it is released automatically. Operation is continuous and one finished gear is obtained for every 90-deg. index of the turret drum.

Equipment for finishing gears included a new machine for lapping external spur, helical and herringbone

gears to smooth the tooth profiles and remove any slight distortions resulting from heat treatment. High production and accurate work are obtained. The machine operates automatically and consistent results are not dependent upon the operator. The work is reciprocated between the laps and in addition is rotated in engagement with the laps, which usually are of cast iron. The reciprocating action gives adequate distribution of the lapping compound over the contacting teeth. Pressure of the laps on the work can be varied to suit conditions.

For accurately inspecting the tooth shape, spacing, diameter, eccentricity of gears, the lead of helical gears and helical guides, the same company developed a gear checking machine featuring simplicity and ability to duplicate measurements within very loose limits of accuracy—to 0.0001 in. and less, with comparative ease, it is said. The machine is designed for shop use and can be quickly adapted for its various operations.

Planers and Shapers

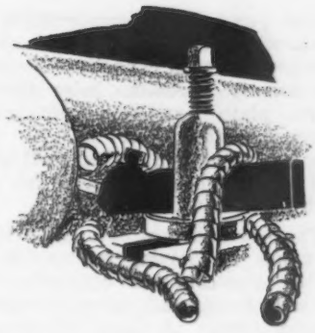
In planers, machines featuring greater ease of operation, heavier construction and higher speeds are available. Welded steel construction has been applied in this field, a 48 x 48-in. x 18-ft. machine having been built with the bed, housings and tiepiece so made. In addition to a 33 per cent reduction in the weight of these parts, the welded design is said to be stiffer, due not only to use of the stiffer material, but to redesign of the various parts to better resist operating stress.

New shapers included a line of 22 crank-type machines built in sizes with a stroke from 16 to 32 in. inclusive. Features include a built-in rapid power traverse and automatic cross-feed to the table, pressure lubrication, and a new type of lock for the tool head, which is operated by a single control. Sixteen feed changes are available. The same company developed a device for lifting the cutting tool of shapers from the work on the return stroke of the ram. It is for use especially with cemented carbide tools.

Highly developed machine tools of many other classes—tapping, pipe threading and cutting, cut-off machines and others—were also brought out during 1932.

Carbide Tools More Solidly Established

USE of cemented-carbide tipped cutting tools has become much more firmly established. Much improvement has been made in the carbides themselves, and the technique of preparation and handling the tools is much better understood. Furthermore, instead of one general grade for all applications, several grades, each having suitable characteristics for different classes of work, are now available.



One company, for example, offers a standard grade for general work on cast iron, brass and other non-ferrous metals, a grade for machining very hard materials, such as chilled iron and glass, and a grade for light work, where chip pressures are not very great, in which service it provides long tool life between grinds, fine finish and close accuracy. Another grade is for high-speed precision boring operations, and a fifth grade is for machining certain classes of steel. This grade has great resistance to cratering. On light finishing cuts on soft steel, cutting speeds are said to be from three to six times higher than high-speed steel. The same company also markets a number of special grades for such uses as rock drills, facing of gage anvils, for saws, etc.

Makers now supply the carbide tools in milled and brazed form, as well as the carbide tips and the completely finished tools. Many toolmakers manufacturing turning and boring tools, milling and other cutters have added cemented-carbide tipped tools to their regular line. A number of machine tool builders are also supplying cemented carbide tools as original equipment with their machines.

An improved grade of Haynes Stellite, termed J-metal, has also been developed and is available in the form of tool bits, welded tipped tools and milling, boring and reaming blades. At speeds, feeds and depths of cut normally used with grade 3 Stellite, the new J-metal gives from two to four times as many pieces per grind. When operated 30 to 50 per cent faster, J-metal is said to produce just as many pieces per grind as produced by grade 3 at the slower speeds.

Machine tool builders have done considerable experimental work in applying the newer hard alloy cutting tools, as shown in the foregoing review, and have developed equipment having the power, rigidity, and the speed and feed range that permit use of these tools to their maximum advantage. Makers of grinding wheels and of grinding and lapping machines for reconditioning these tools have also contributed to wider use of the cemented carbides.

Applications of these newer hard alloy tools have steadily increased, and practically all the large production plants are now extensively tooled with them. Further development work is in progress, especially in the field of new grades for the machining of steel, and it is predicted that in 1933 some new cemented carbides that will be really practical for many operations in the machining of steel will be introduced.

Large Presses Equipped With Automatic Feeds

PRESSES for operating the larger stamping, forming and bending dies, or gangs of dies, particularly double-crank machines, predominated in last year's announcements. Faster operation, increased ruggedness and greater flexibility of control were features. Several of the newer presses are equipped with electro-magnetic controls for the clutches and brakes, making possible either single-stroke operation, continuous operation for automatic feeds, "inching" the slide when setting dies, and emergency stopping at any point of the stroke. In some cases safe operation is assured by locating push buttons on the slide itself.

Welded steel construction has been extended to new lines. Automatic lubrication, alloy steel crankshafts and the use of anti-friction bearings for the driving and intermediate shafts are not uncommon, and in some cases the flywheel runs in anti-friction bearings.

Automatic feeds, heretofore applied mainly to small and medium size presses, now feature many machines of the heavier class. The trend toward elimination of intermediate handling of the work continues, this being accomplished by combining groups of operations on a given part in a single die or by use of a series of dies in automatic "gang" presses equipped with transfer feeds. In performing several operations at one stroke, these gang presses produce work that ordinarily would require a series of machines, with savings in labor and in floor space.

One of the "gang" presses introduced this year is equipped to produce an eight-operation conical stainless-steel shell having a number of holes, bosses and flanges in the bottom. The shells are made from a No. 24 gage, 6¼-in. blank, and when finished are about 4¼ in. in diameter and 2 in. deep. They are produced at the rate of 30 a minute, the press performing 240 operations a minute. The previously cut blanks are stacked

on a large feed tube, from which they are pushed into the first-operation forming die. The shell is then ejected from the die, caught by the fingers of a "cut and carry" feed, and is carried successively under the several punches and finally discharged into a chute.

Another "gang" press is designed to produce up to 60 pieces a minute. Coiled stock fed into the machine automatically is blanked out in the first operation and then moved to the first forming die by means of a mechanical pusher. The piece is then carried from die to die by suitable transport grips, and when finished it drops into a chute. The scrap left after blanking is cut into small pieces, which fall into the chute. Two bands of material can be fed for making laminated parts. Machines of this design can be furnished with as many as 12 or more tool stations.

Continued Development in Automatic Feeds

In roll feeds, one large double-crank press featured an unusually elaborate feed. Sheets placed on the feed table pass through oiling rolls into the main feed rolls, which move them across the dies and to the discharge rolls. The latter feed the tail end of the sheet through a scrap shear. The finished pieces remain in the punch until the top of the stroke, when they are knocked out and fall into a blank removing device.

Advance in size of automatic roll feeds continues. Such feeds are now obtainable to handle up to 50-in. feed lengths and stock widths up to 60 in. Feed rolls having a diameter up to 15 in. have been built and rates of feeding up to 1500 to 2500 in. per min.

Demand for automatic types of equipment, begun in 1930, continues. High production automatic presses that permit operation of single, multiple and follow dies at rates of 200, 300 and 450 strokes per min., are available.

Building of presses of the four-point suspension type, characterized last year as a radical departure in press design, has been taken up by other makers. Presses of this type apply power at each of the four corners of the die, and are especially suited for large-area, light-gage operations. They are more or less independent of any unbalance of the layout of the operation. Remarkably long die life is claimed. The machine brought out this year weighs about 300,000 lb., and is driven by a 60-hp. motor.

More Presses of Welded Steel Construction

New presses having members made of welded steel include a 350-ton double-crank machine, the bed, uprights, crown, slide and twin gears of which are of this construction. Marked reduction of deflection in the frame members is claimed for this design. A large welded-steel inclined gap-frame press was also introduced. A 50-ton welded steel frame, deep-throat punch press was brought out by another company, and a multiple punch press with capacity for punching twenty 13/16-in. holes through ⅜-in. plate was also built. Side frames of the latter machine were gas cut from 5-in. thick steel plate, and the flywheel is a ring of steel with the web welded in.

The bed and ram of a press brake that has all driving mechanism attached to or contained within the base, instead of overhead, are now made of welded steel. A line of bending brakes having welded steel housings was introduced by another maker.

Welded dies made from gas-cut steel plate are being used. Well-designed dies fabricated by this method are said to provide marked reduction in weight without sacrifice of rigidity essential to the production of accurate pieces. Dies having a low-carbon steel body and a hard shearing edge which is built up by depositing a hard alloy and then ground to the required contour have been made. Composite dies, consisting of tool steel welded to machine steel, are being successfully applied.

Die sets made up of two plates gas-cut to the proper contour are made; also blank holders which are gas-cut and welded. One maker of die sets has recently established a torch-cutting and welding department to facilitate production of special die sets, die shoes, bolster plates, stripper plates and similar die parts.

Massive Sizing Presses

Two massive sizing presses featuring rapid and accurate production and ease of control were brought out. The slides of these machines are designed to assure unusual accuracy at the extreme end of the stroke. Improved self-contained hydraulic platen presses for forming, drawing, bending and other operations were also announced. One of the latter is obtainable in 11 pressure capacities, from 100 to 2000 tons. A steam platen press which exerts the enormous pressure of 10,000 tons on the platens has been built recently. This machine has 12 18-in. rams, each of which are operated at 6500 lb. per sq. in. hydraulic pressure.

In roll formers, one maker has developed a new line designed to provide flexibility—maximum adaptability of the basic design to meet particular requirements. Another builder announced a series of open-side machines featuring ease of access to the roller dies, quick changing of rolls and silent operation. Controls include a push button for "inching."

Welding and Cutting Advance With Better Apparatus and Supplies

NEW or improved equipment and supplies developed to increase the speed of welding or to produce welds of better quality, or both, were made available in 1932 in all branches of welding—gas, electric arc, atomic hydrogen, resistance and thermit.

In oxy-acetylene welding and cutting apparatus, torches for single types of work, such as aircraft, saw, and pipe-line welding, continue to be developed. Special apparatus for heat treatment of rail ends, and for burning or cleaning rubber tire molds has also been supplied.

Two-stage regulators are being more widely used, and a "fixed-pressure" appliance, similar in principle to a regulator, has been developed. This is set to deliver gas at a predetermined maximum pressure, above which the operator cannot boost it. Regulators that provide unusually large or small volumes of gas at unusually high or low pressures, have also been brought out.

For machine flame cutting, a wide range of equipment, single and multiple cutting, automatic and semi-automatic, stationary, portable or rail type, is now available. New developments include a tool room profiling machine for cutting dies, cams, etc., from material ranging from ¼ to 8 in. thick. An improved motor-driven machine for straight line, circular and contour cutting, also beveling, was introduced by another company. For straight-line cutting the machine travels on tracks, the carriage traveling at rates from 3 to 28 in. per min. The same company brought out a portable machine for cutting-off and beveling pipe to the desired angle for welding. It is designed for use on 4 to 30-in. pipe, which it cuts and bevels accurately in one operation. The machine may be used on either pipe that is free to turn on dollies or that is fixed in position. In the latter case the machine itself is rotated around the pipe. Applications include cutting out of faulty welds or old screwed couplings, leaving the pipe beveled for welding. This is done with two torches, one set on each side of the coupling.

Cutting of cast iron is now a well understood and widely used process. Preheating flame adjustment, as well as torch manipulation, is different from that used for cutting steel.

Improved welding rods and fluxes continue to be developed. The field of application of welding with bronze rods has been extended considerably. In joining steel, tensile strengths of more than 50,000 lb. per sq. in. together with excellent ductility and freedom from porosity, are said to be obtainable. Improved techniques have been developed for the bronze-welding of cast iron, malleable iron, steel, copper and other metals, and for the fusion welding of brass and bronze.

The fluxes for welding with bronze rods, with cast iron rods and for welding with stainless steels, aluminum and aluminum alloys have been generally improved.

Flame Machining, a New Development

An outstanding development is "flame machining," or the rough hogging and shaping of carbon steel parts by the oxy-acetylene cutting process. The process is closely allied to flame cutting but in it, the oxygen stream is positioned tangentially, so that wide strips or linear areas are removed from the surface of the work. By means of a low-velocity jet of oxygen issuing from a comparatively large nozzle, grooves up to 2 in. in width and ⅜-in. or more in depth have been cut at linear speeds ranging from 15 to 30 ft. per min. Under certain conditions, higher speeds are said to be possible. In lathe roughing operations, tests are said to indicate metal removal ranging from 500 to 1800 lb. an hour.

Flame machining operations break down into flame planing, milling, turning, drilling and punching and flame boring. Not all of these have commercial application as yet. Flame planing, however, has been applied commercially in deseaming billets and slabs, and in exploring and cleaning up cracks and sand holes, etc., in steel castings. A form of "punching" that has been used somewhat is the flame "centering" of solid round billets in preparation for piercing in the manufacture of seamless steel tubing. Preparing of welding grooves in steel plate and gouging out defective welds are other uses now made of the process.

Rough flame planing, now under development, includes multiple cuts by means of a gang assembly of planing nozzles, as well as single cuts with one nozzle. Uniformity of flame-planed surfaces is approached by overlapping of the cutting oxygen stream or by trailing cuts. It is stated that rough surface planing within at least ¼ to ⅛ in. of finished dimension is near at hand.

Use of Hard-Facing Increases

Use of hard-facing, or the application of a thin coating of a hard wear-resisting alloy to wearing surfaces of machine parts either by the oxy-acetylene or the electric arc welding process has increased. Steel mill applications now include furnace charging rams, screws for mud guns, tap hole drills, and skulling hooks. In rolling mills and accessory equipment, hard-facing has been applied to guides, diagonal rolls, housing liners, bearings, gag press hammers, and blooming mill spindles and sleeve gears.

Shear blades of all types for hot metal have been hard-faced with marked increase in life. Hot trimming and forming dies made from carbon steel and then hard-surfaced are used in many automobile and forge plants, such dies replacing those of more expensive special steel. In many cases worn dies that previously had been scrapped are now being built-up and hard-faced, and then returned to use.

Arc Welding Sets for Heavily Coated Electrodes

INCREASED use of heavily-coated or "shielded arc" type electrodes was a noteworthy trend of the past year, and a number of arc welding sets with the higher current, voltage and other characteristics that adapt them for operation with such electrodes were brought out. These are available in a variety of styles—portable and stationary, trailer, motor and gasoline engine driven. Some are furnished with an auxiliary generator for furnishing current for lighting and tool operation. A new 300-amp. gas-engine driven unit having a shaft extension for compressor drive, thus adapting the welder for field use where air tools are to applied.

A new portable a.c. welder for use on thin-gage material has a welding range of 4.5 to 129 amp. For railroad applications, a new track welder featuring quick removal from the track has been developed for building up worn track ends, manganese steel frogs, etc. Weighing only 1450 lbs., this equipment is unusually light.

New Automatic Welding Machine

In automatic arc welding equipment, an outstanding development was an automatic head designed to use a heavily coated rod in long continuous lengths. The electrode, also a new development, is such that it can be coiled or uncoiled without any flaking or cracking of the coating. As the device feeds the electrode down and into the arc a small strip of the flux coating is automatically removed from the electrode to permit narrow sliding brushes to make contact with the metal of the electrode. The arc length is controlled automatically by the head, just as in the standard bare wire automatic welding head. It is stated that welds of the quality required by the boiler code can be produced by the automatic equipment and new electrode.

A wire feeding head designed to permit automatic welding with the "shielded" arc process was introduced by another company. A fibrous autogenizer is fed into the arc; in burning, this autogenizer forms a gas that excludes oxygen and nitrogen from the molten metal. The welding head utilizes the carbon arc; its speed of travel can be varied through a wide range. Filler metal in strip form is fed into the arc from a reel mounted on the head. Only one size of filler metal is necessary and as the filler metal carries no current, its size is independent of the current used for welding.

Several New Electrodes Brought Out

A number of special coated and covered electrodes that permit higher speeds of welding with improved quality of weld, both as to ductility and strength, have been introduced. One new line having a heavy all-mineral coating includes types for welding mild steel, manganese steel, 18-8 rustless steel and rustless iron. The spiral winding of asbestos yarn serves to hold the heavy mineral flux to the core so that it is not injured if the electrode is bent. The electrode burns without fumes or smoke, and the thickness of its coating is said to enable the operator to ride the electrode on the work, thus letting the flux coating space the arc.

Another company brought out special electrodes for welding rustless steel, unusual performance being attributed to a special flux coating. For building up and reclaiming 11 to 14 per cent manganese steel castings, electrodes that are said not to remove the effects of heat treatment through which the castings are put to assure maximum resistance to impact and abrasion have been developed. They are also suitable for hard surfacing high carbon and soft steel parts. A new electrode for welding sheet and cast aluminum has a coating that prevents excessive oxidation and dissolves any aluminum oxide that might be formed. The coating is also said to give a smooth arc. The resulting weld is dense, has high tensile strength and can be polished with very little discoloration.

Three different service requirements are met by another new electrode, the coating of which does not flake under rough treatment. Heavily-coated electrodes primarily for overhead and vertical welding by hand, as on position welds in pipe line construction, were also brought out.

In a new type electrode holder developed for atomic hydrogen arc welding, flexible tungsten electrodes are carried in curved tubes that form part of the holder, and are brought into position by means of a screw feed ejector. The electrode can be consumed to a length of about 1½ in., at which point it drops out and is replaced mechanically by another. Advantages include easier operation in confined positions, and lower operating costs, made possible by the flexibility of the electrode, which reduces breakage.

Better Materials Handling Methods Co

By MATTHEW W. POTTS

Sales Engineer, Albey-Ferguson Co., and Secretary Materials Handling Division of the A. S. M. E.

THE period of readjustment through which all industry is passing naturally is reflected in the field of materials handling equipment. Activity has been considerably restricted during the past year, despite low prices and the evident savings possible with suitable materials handling facilities.

The sale of all kinds of machinery has been abnormally low, of course, but the sales resistance to processing equipment is somewhat less than that to materials handling equipment. It is easier to see the need of a machine actually to make a product than of a piece of equipment to cut costs between machine operations; but often the lack of materials handling equipment more than sacrifices the savings made by an efficient processing machine. A double saving is possible, in many cases, when the installation of a new machine is accompanied by new materials handling facilities.

May Turn Operating Losses Into Profits

It is not necessary, however, to wait until new manufacturing machines are purchased to make improvements in materials handling methods. Substantial savings have been obtained by installing handling equipment without any change in processing machines, aside, perhaps, from a new layout. In fact, there is scarcely a plant now operating at a loss, or at an extremely small margin of profit, that could not better its situation by improving its handling methods. Better handling methods may turn operating losses into profits.

Materials handling progress is hampered from two sources, one within and one outside of industry. In both cases the obstruction is due to lack of knowledge and to misconceptions. Within industry the trouble arises in those managements controlled by officers and directors who originate from non-industrial fields, and whose plant administration policies are influenced more by financial than by sound industrial and economic considerations.

From outside of industry, the obstacles in the way of extensive use of materials handling equipment arise among those who are conscientiously laboring to solve the unemployment problem, but in a field they unfortunately know little about. Materials handling equipment certainly tends to reduce the amount of human energy expended in the making of products, and in this sense, of course, it cuts down employment. It is not the job itself, as such, that is the pivotal factor, but the job economically done. A foundry could engage a small army of men to carry pig iron by hand, piece by piece from freight car to cupola; sand, bucket by bucket, to the mixing and molding machines; molten iron, ladle by ladle, from cupola to flask; but who would pay the exorbitant price of castings made under such methods. If we would not go back to such antiquated methods, why not continue to go forward?

The foregoing is presented to remove the misconception that materials handling equipment must cause unemployment. It naturally causes some *shifts* and readjustments in employment. It is "labor-saving equipment" in that it removes much of the drudgery from industrial work, and performs many tasks that would be

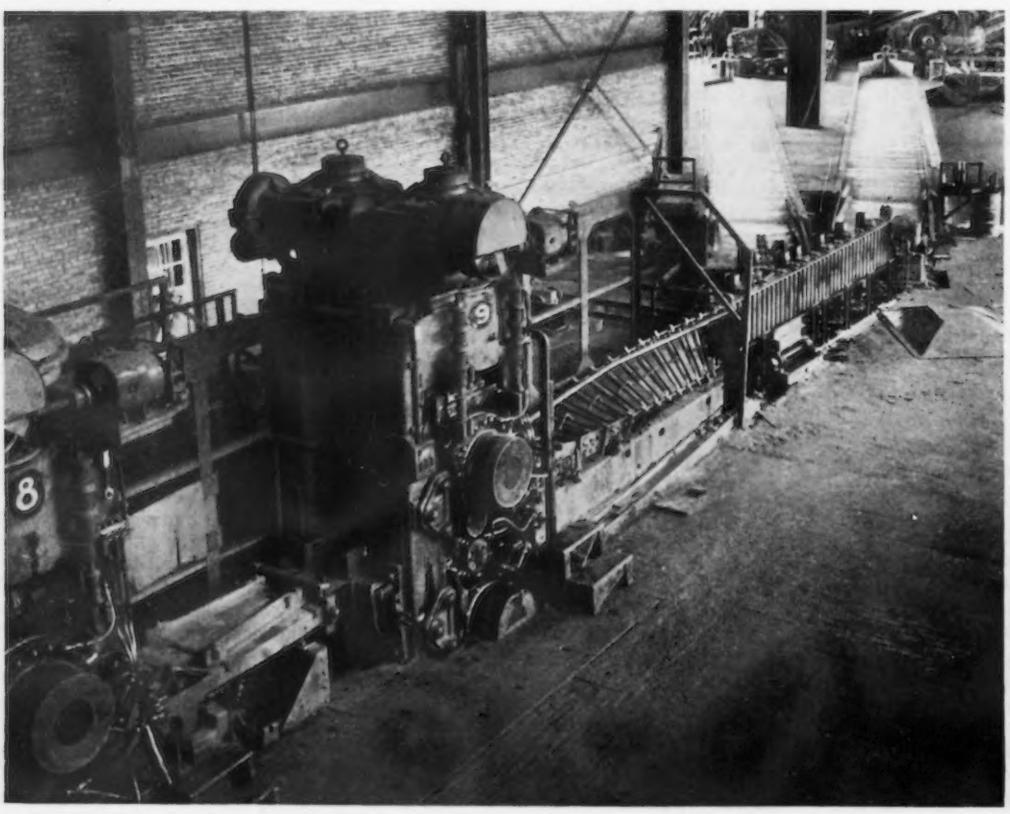


FIG. 1—90-deg. twisted-spout and vertical Y-Section of heavy-duty roller conveyor at Sharon Steel Hoop Co., Sharon, Pa.

ds Contribute to Lower Processing Costs

impossible — certainly economically impossible without it. But it is preeminently "cost-reducing equipment." Materials handling manufacturers and users should clearly recognize the distinction and cooperate in efforts to stamp out the false, even though well-meaning, propaganda against the development and installation of such equipment.

Unusual Application of Roller Conveyors

As materials handling equipment is usually designed for particular jobs and installations, it is natural that in a period like the present there has been a decrease in the development of new devices. However, considerable advance has been made in applying materials handling equipment to process machines. An unusual application of heavy-duty roller conveyors, for example, is that of a 90-deg. twisted spout conveyor furnished the Sharon Steel Hoop Co., Sharon, Pa. This installation is shown in Fig. 1.

Fig. 2 shows the design of an automatic load control for conveyor drive units and the like, which can be used either as a means for stopping the conveyor in case of a jam, or as a device for synchronizing multiple drive units when the conveyor is driven at more than one place.

The device is used in combination with a variable-speed transmission and in accordance with a predetermined load variation automatically speeds up or slows down the drive. This action is accomplished through a balancing arm installed between the variable-speed transmission and the reduction unit. This balancing arm is counterweighted to sustain the normal conveyor load. When this load varies up or down the balancing arm reacts immediately upon the electrical remote control device that regulates the speed of the variable transmission. This arm is so sensitive that a fractional variation in load is measured at once and compensated for. When the control is used as a safety device any dangerous increase in load imposed on the machine or conveyor, due to accident or other reasons, will cause the balancing arm to operate a limit switch cutting off the power.

Heavy-Duty Rollers for Gravity Conveyors

A development in the field of gravity conveyors is the heavy-duty rollers shown in Fig. 3. This design has a continuous load rating of 8000 lb. per roller. It is the largest of the line, and between it and the smallest of this design, which has a load rating of 150 lb. per roller, there are various sizes.

ALTHOUGH the past year was not conspicuous for number of new devices, considerable advance was made in applying materials handling equipment to process machinery. Interesting examples drawn from various industries are cited by Mr. Potts.

Fig. 4 shows new construction of the gravity bearing protected both front and back and using steel shields as retainers for the seal. The center of the inner shield is bent inward, forming a funnel shape to keep the grease from working out through and into the rollers. The time for replacing or flushing the bearing varies from 12 to 24 months. The hexagon-shaped shaft furnishes a positive lock for the inner ball race.

The way various types of materials handling equipment can be employed as process equipment is shown in Fig. 5, which pictures a steel belt noodle cooker of unique design in the plant of the LaChoy Food Products Co., Detroit. A fabric belt conveyor (shown at the right) delivers uncooked noodles to the steel belt. A take-up pulley on this belt is clearly shown in the center of the picture. By the use of snub rollers the steel belt dips down into a 20-ft. long tank of vegetable oil, which ranges in temperature from 250 to 325 deg. F. The steel belt is 24 in. wide and the approximate center distance between drive and take-up pulley is 35 ft. Belt speeds, variably controlled, range from 2 to 8 ft. per min.

Increased Output in Cooker Installation

At the unloading or discharge end the steel belt operates on an incline, thus carrying the cooked noodles out of the tank, thoroughly draining them of oil, which returns by gravity to the tank. The overhead chain conveyor traveling above the tank supports rakes at intervals and operates directly over, and at the same speed as the steel belt. This chain, with the rakes, keeps the noodles in position on the steel belt by traveling through the hot oil and also up the incline at the discharge end of the unit.

Previously noodles were handled by intermittent basket type conveyors and were hand-dipped into a kettle for cooking. The output by the old method was 60 lb. an hour—it is now 250 lb. an hour. The saving in labor effected by the installation is 40 per cent, in oil used 30 per cent, and in fuel consumption 50 per cent.

It has also been found that certain machine tools operating at high speeds require conveyors for carrying away chips. A 100-hp. 22-in. swing lathe recently built for testing cemented

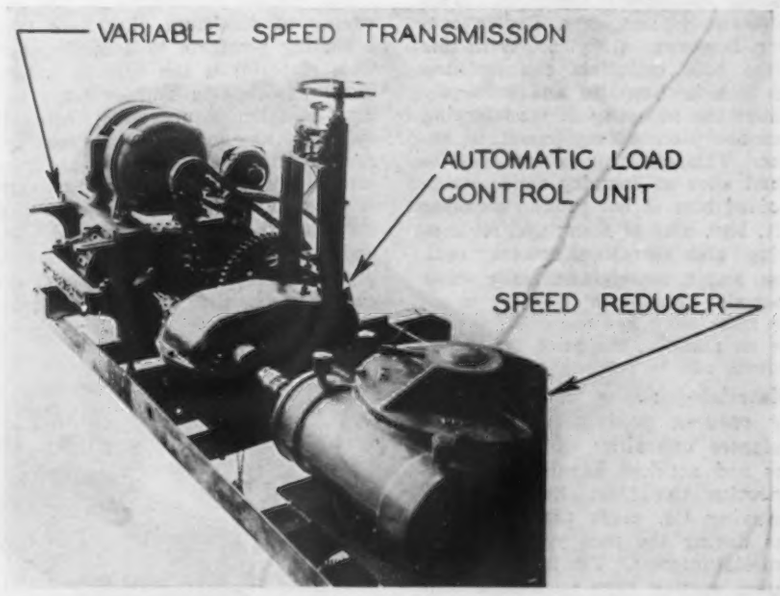
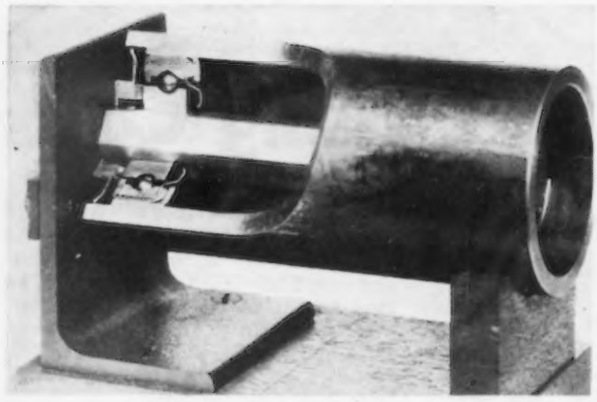


FIG. 2—Compact drive with automatic load control unit which can be used for synchronizing two or more drives on the same piece of apparatus.



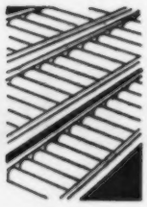


FIG. 3—Sectional view of heavy-duty gravity roller with sealed end and locked shaft. This type is made with load ratings of 8000 lb. per roller.

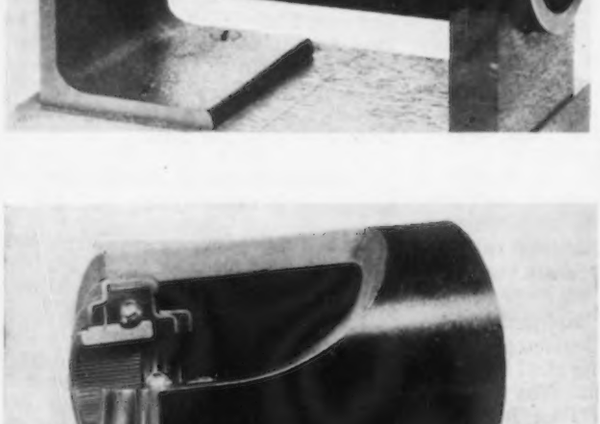


FIG. 4—Heavy-duty roller with grease-sealed bearing using steel seal shields and hexagon shaped shaft for locking inner-ball race.

carbide cutting tools is equipped with a conveyor designed to handle 15 cu. ft. of chips a minute or more than 2 tons an hour.

Materials Handled Horizontally and Vertically Without Transfer

A new principle in bulk handling has been developed in England, and American manufacturers are now building equipment using it. This equipment, known as a Redler conveyor, is shown in Fig. 6. With this system bulk materials can be handled both horizontally and vertically without the necessity of transferring from one piece of equipment to another. This conveyor is now used to unload silos of foundry sand; vertical-sided bins of hot ground cocanut; 75-ft. high bins of flour; and for conveying and elevating cement, coal, cocoa, sugar, starch, and many other materials. Inasmuch as there is almost no relative movement of one particle on another, the most fragile of products can be carried.

Materials-handling equipment not only reduces production costs but eliminates unhealthy working conditions and accident hazards. In this connection the Dust Recovering & Conveying Co. made three installations during the past year that are of special interest. The first is a high vacuum suction type pneumatic conveyor to unload crude arsenic. This material is poisonous and it is essential to observe special precautions in unloading it.

Since the complete system is under suction, there is no leakage of material at any point, and high-efficiency fabric filters remove over 99½ per cent of the dust from the conveying air before this air is exhausted to the atmosphere through the vacuum pump.

The second installation is the conveying of dicalcium phosphate from a loading platform to a mixing pan. This material is the base of a well-known toothpaste and extreme care must be taken to prevent its contamination by any foreign substance. Two precautions are taken to insure absolute purity of the product. First there is an atmospheric filler in the room in which the hopper is located. Secondly, all parts of the intake hopper, pipe line, receiving hopper, and discharge mechanism are of non-ferrous metal. The material is therefore conveyed by clean air and is brought in contact only with rustproof metals throughout the whole system.

The third installation is a pneumatic conveyor to unload alum, lime, and soda ash from freight cars to storage bins. Such a system eliminates disagreeable working conditions where such materials have to be handled.

Developments in Industrial Trucks

In the industrial truck field, makers of both gasoline and electric trucks have announced developments in various types of equipment. The Clark Tructractor Co. has announced a new lifting and tiering truck, Fig. 7, that will pick up skidded or cleated loads with as low as 2 in. under-clearance. The 2-ton model has a turning radius of 89 in., the 3-ton model 98 in. Maximum lifting and carrying capacity are provided for by the powerful hydraulic lift, mounted over extra large (15 x 7 in.) rubber tires.

Electric tiering trucks are now obtainable in capacities from 500 lb., with a lift of 184 in., to 10,000 lb. with a lift of 106 in. Intermediate sizes of 4000 and 6000-lb. capacity have also been built. One of these is shown in Fig. 8; note that the operator is riding on the platform and controls the

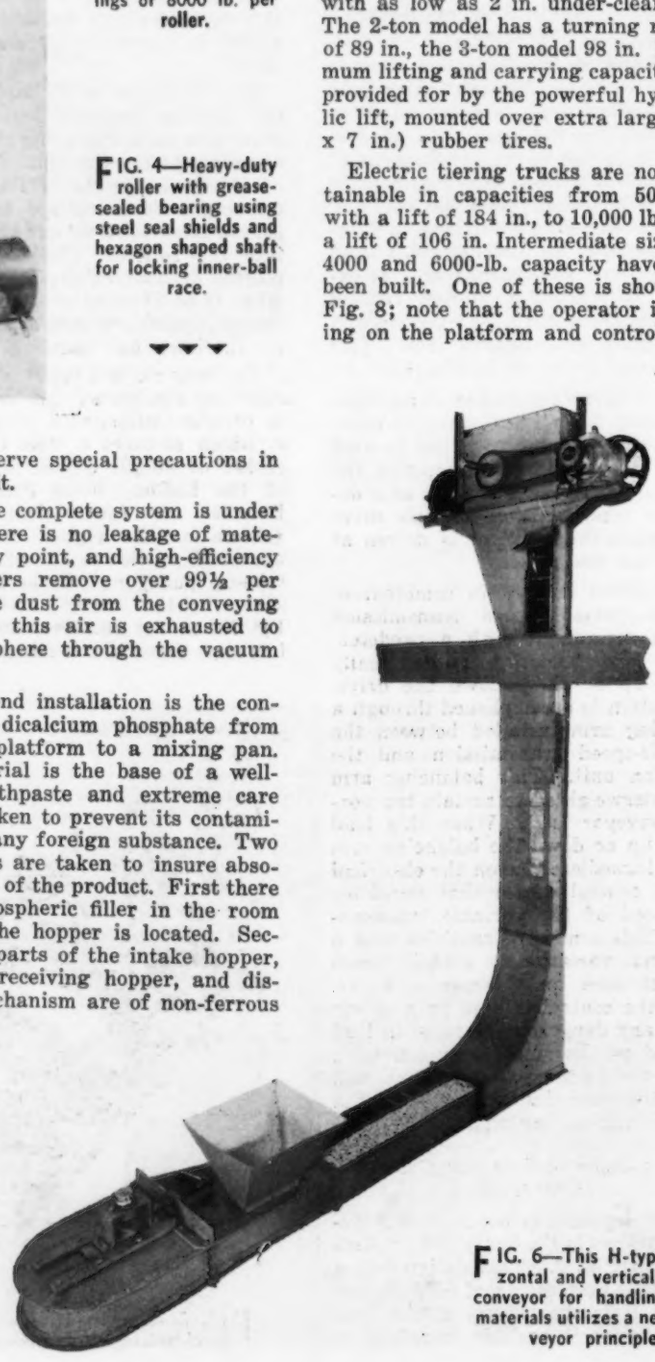


FIG. 6—This H-type horizontal and vertical Redler conveyor for handling bulk materials utilizes a new conveyor principle.

platform with a remote control switch.

Advances Made In Truck Accessories

Progress has also been been made in development of accessories on electric trucks. Rubber pads have been placed on operators' platforms to reduce the vibration and add to the operator's comfort. Ball and socket steering connections, pressure lubricated, have been made standard equipment, replacing the old pin and yoke, gravity oiled steering connections. The higher types of battery both alkaline and lead acid have found great favor and with the gas-electric power unit have required a redesign of most power unit compartments.

Wider uses for the various kinds of equipment have been noticeable during the past year since there has been insufficient work for the trucks to perform on the jobs for which they were purchased.

An outstanding improvement in the floor truck field has been the adoption by several makers of rubber-tire wheels for casters and floor trucks. Improvements in design and construction of the tires and wheels have been very noticeable, and a number of manufacturers have adopted the new easy-rolling rubber in the wheel tread.

There has also been a more decided trend toward the use of roller bearings in floor truck and caster wheels, particularly for the lighter and medium-duty equipment, which generally has used plain bearings.

As in other fields, welded steel construction has been more extensively applied, especially in conveyors. An example of its use in the construction of an electric truck is shown in Fig. 9.

Photo-Electric Devices Employed

Many aplications of the photo-electric cell for actuating switches, deflectors, and even selecting packages according to size, have been made in the conveyor field. Photo-electric devices have also been used for actuating equipment designed to open doors to permit the passage of electric trucks and tractor-trailer trains.

Great strides have been made in devices for selectivity in the continuous routing of packages to various stations, and this will no doubt be developed further by the conveyor and mono-rail manufacturers.

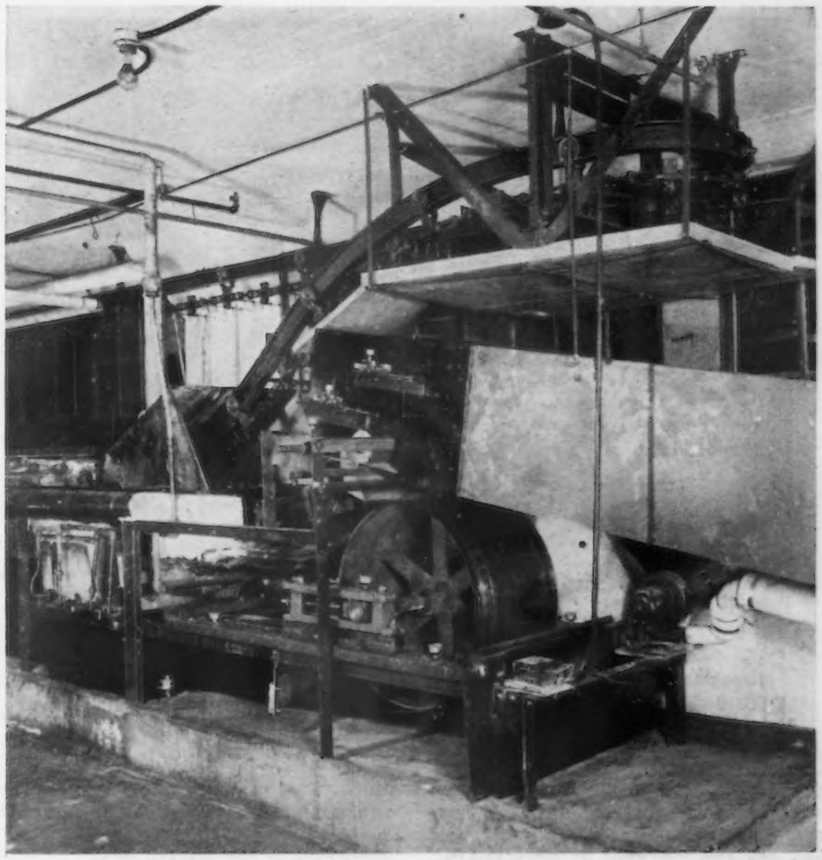


FIG. 5—Application of fabric belt, steel belt and overhead chain trolley conveyor to make process unit for cooking noodles.

The coordination of various types of equipment into one unit, as shown in Fig. 5, is also being accomplished.

It has also been found that all types of materials handling equipment can serve not only as transport mediums but also as an actual part of the process equipment, and by using the various devices and equipment now manufactured, it is possible to quickly assemble process units which not only handle materials but route them over a definite schedule at the same time that process operations are being performed either manually or automatically.

Standardization of Parts Permits Coordinated Systems

Manufacturers of various types of materials handling equipment are going to be called upon by the users to adopt more rigid standardization so as to make it possible to interchange different manufacturer's parts, or at least so that they can be coordinated in the development of revised systems. This feature has been overlooked in the past as it was always cheaper to purchase new equipment and quite frequently no old equipment was available in the plant. But now with the many changes taking place in our

FIG. 7—Tiering truck equipped with finger lifting unit operated by hydraulic lift mounted over large-sized wheels.

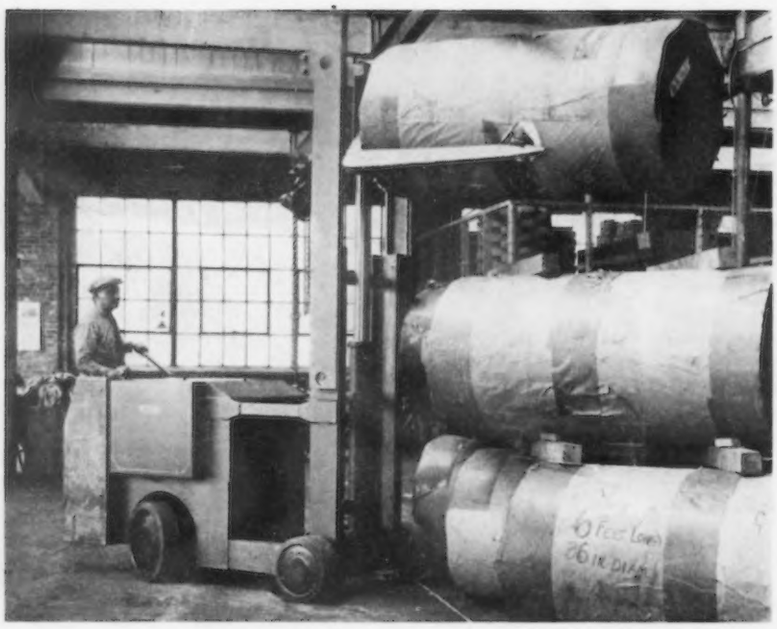


FIG. 9—This finger truck for handling paper rolls is of welded construction throughout.

FIG. 8—Electric tiering truck (at right) with remote control button on platform so that operator can ride up and down with load.

production set-ups we find it necessary to use up old equipment before new can be purchased, and this has brought out the need of standardization. This is particularly true in the continuous conveyor field and should be given serious thought by the manufacturers in the coming year.

New Steel Capacity

(Concluded from page 33)

together the ends of coiled strip as the steel goes through the pickler and flying shears for cutting off the strip to required lengths as it goes into the cold mill. The cold mill, pickling machine and flying shears were built by the United Engineering & Foundry Co., which also constructed the hot mill. The welding machine was supplied by the Federal Machine & Welder Co.

Babcock & Wilcox Tube Co.

A Diescher type mill for the production of seamless tubing was placed in operation last year by the Babcock & Wilcox Tube Co. at its Beaver Falls, Pa., plant. Existing equipment was utilized to some extent, and the capacity of the old unit was materially increased. Full description of the new installation will appear in THE IRON AGE at an early date.

Central Iron & Steel Co.

The Central Iron & Steel Co., Harrisburg, Pa., last year completed the following improvements:

Three 500-B. H. P. fire tube waste heat boilers on open-hearth furnaces, together with a 12-in. steam line 1800 ft. long, connecting these boilers with other departments; one 32,000-gal. steel plate settling tank and a boiler feed pump for supplying treated feed water to the above waste heat boilers; installation of Blaw-Knox patented water-cooled valves on several open-hearth furnaces; complete Smoot combustion control equipment on one open-hearth furnace, together with Wing turbo-blowers on the gas producers for the same furnace; Leeds & Northrup automatic temperature reversing controls on another open-hearth furnace.

Plans and estimates are being prepared and studied in connection with a proposed electric power plant for present requirements as well as for future expansion. Several additional open-hearth waste heat boilers would be required in this connection as the electric power plant would be operated with waste heat steam.

Miscellaneous Improvements

Colorado Fuel & Iron Co., Denver, Colo., rebuilt last year one blast furnace, one open-hearth furnace and made complete alterations in its rail mill. The rebuilt blast furnace, D, now has a capacity of 500 tons a day. The open-hearth is now a 75-ton furnace.

Inland Steel Co., Chicago, completed last year its new continuous hot and cold strip mill. It was described in THE IRON AGE, June 23.

Ludlum Steel Co., Dunkirk, N. Y., last year made certain changes such as motor drives on its mills, changing from A.C. to D.C. motors, thereby giving variable speeds and at the same time higher speeds on the mill equipment. This is pointed out as giving a more flexible setup and also increased production.

Andrews Steel Co., including the Newport Rolling Mill Co., Newport, Ky., made in 1932 a number of changes in its equipment which have improved manufacturing facilities.

Tulsa Steel Co., Inc., Sand Springs, Okla., installed last year a 16-in. rail slitting mill.

Judson Mfg. Co., Emeryville, Cal., purchased during 1932 a plot of 22½ acres on the water front where it contemplates the construction during this year of additions to its rolling mill equipment, furnishing an additional capacity of approximately 4500 tons.

Additions to Open-Hearth Capacity Since the War

Year	Annual Capacity, Gross Tons	Year	Annual Capacity, Gross Tons
1919	625,000	1926	865,000
1920	675,000	1927	630,000
1921	247,500	1928	895,000
1922	227,500	1929	1,005,000
1923	875,000	1930	845,000
1924	375,000	1931	4,075,000
1925	585,000	1932	100,000

Impending Releases by Chrysler Will Mark Renewal of Buying at Detroit

DETROIT, Jan. 3.—Steel demand from the automobile industry slackened perceptibly the past week, but a renewal of buying is expected in the next seven to ten days. The Chrysler Corpn. shortly will give steel releases for its requirements after Jan. 15, with the benefits accruing to the local steel mill as well as to several outside mills. Its January schedule is understood to call for about 25,000 cars, of which 15,000 will be Plymouths.

Chevrolet's program will be carried out unaltered this month, with production totaling about 55,000 cars. Ford still is an enigma so far as its steel requirements are concerned. Recent purchases have been inconsequential, but sizable releases may come through at any moment. It is now considered doubtful whether Ford's output during January will reach the earlier estimated 20,000 units.

Car makers are regulating operations carefully so as to avoid overestimating retail market needs, as they did a year ago. It will be recalled, for instance, that Cadillac turned out cars at such a high rate in the first four months of 1932 that its factory was virtually closed for the succeeding seven months. This year it is pursuing a more conservative course, scheduling about 1000 cars for this month and 800 for February and thereby assuring uninterrupted production through at least most of 1933.

January assemblies for the industry still are expected to exceed those of December.

The Great Lakes Steel Corpn. continues to run five of its six 150-ton open-hearth furnaces.

Railroads Expect Freight Surcharges Will Be Continued After March 31

WASHINGTON, Jan. 3. — The railroads believe that the Interstate Commerce Commission will grant their request to continue prevailing surcharges after March 31. The carriers presented their case before the commission last Wednesday and were undoubtedly encouraged in their view that the extra charges would be maintained by the statement of Commissioner Meyer. After the carriers had presented their pleas, which merely restated the unfavorable financial position of the carriers, Mr. Meyer said so few requests to submit testimony had been made that it was possible the case would be closed Jan. 15 without further hearing.

The commission has given shippers until that date to file their views. There still is a belief in some quarters that shippers' protests may begin to come to the commission to a greater degree than the statement of Commissioner Meyer would indicate. At the same time the principal shippers' organizations are reported to have agreed not to oppose the petition of the carriers.

In the course of testimony given before the commission, the carriers pointed to the fact that as a whole they are facing a deficit or $200,000,000 for 1932. A statement by R. H. Aishton, president of the American Railway Association, reviewing the performance of the railroads in 1932, said that the year both in traffic and earnings "has been as great a disappointment to the railways as to other lines of industrial effort."

The association has made an estimate that freight car loading in the first quarter of 1933 wil be 4 per cent less than the actual loadings in the same quarter of 1932. The opinion is based on returns of the 13 Shippers' Advisory Boards. In the iron and steel field, it is estimated that carloadings in the first quarter of 1933 will total 161,878, a decrease of 9.2 per cent from the 178,233 cars loaded in the corresponding quarter of 1932. Machinery and boilers are estimated to require but 14,847 cars, a drop of 15.4 per cent. Coal and coke loadings are estimated at 1,696,275 cars, a decrease of 2.3 per cent. Whole ore and concentrates are expected to require 33,647 cars, a decline of 16.9 per cent.

While the association statements reflect the exceptionally high number of cars and locomotives needing repairs, it is also true that the carriers have unusually heavy surpluses of both cars and locomotives which could be pressed into service if needed before any extensive repairs or building of new equipment would be necessary.

To Discuss Welding of Heavy Equipment

Welded construction of heavy mechanical equipment will be described in two papers to be presented at a joint meeting of the New York section of the American Welding Society and the machine shop practice and iron and steel divisions of the American Society of Mechanical Engineers, to be held on the evening of Jan. 10.

A. E. Gibson, vice-president, Wellman Engineering Co., Cleveland, will speak on "Application of Welding to the Manufacture of Heavy Mechanical Equipment," and H. G. Marsh, Carnegie Steel Co., Pittsburgh, on "Welded Design and Construction of Heavy Industrial Equipment." W. W. Macon, consulting editor, THE IRON AGE, will preside.

Reductions Proposed on Some Scrap Freight Rates

WASHINGTON, Dec. 31. — Rates on scrap iron and steel from Asheville and other North Carolina points and Trammell, Va., to Portsmouth, Ohio, would be placed on a basis of 15 per cent over the first-class rates prescribed for a similar distance to Kenova, W. Va., in the Southern revision case if the Interstate Commerce Commission approves a report by Examiner A. E. Later.

Rates from North Carolina and South Carolina points to Steelton, Pa., would also be reduced from the existing rate of $6.45 per gross ton. A rate of $5.35 would apply from Asheville, Biltmore, and Hendersonville, N. C., and from Spartanburg and Greenville, S. C. From Sylva and Canton, N. C., and from Anderson, S. C., the rate would be $5.45. From Charlotte, N. C., it would be $4.36. A number of rates were found not unreasonable in the past but were held to be unreasonable for the future.

Complaint against the rates was made by the American Scrap Material Co. and others.

F. X. A. Eble to Retire as Customs Commissioner

WASHINGTON, Dec. 31.—Commissioner of Customs F. X. A. Eble will resign soon to resume his former post as Treasury attache in Berlin about Feb. 1. The Civil Service Commission authorized the re-transfer of Captain Eble to the classified service in order that he could again take up his work in Berlin. His resignation as Commissioner of Customs was occasioned by political exigencies, inasmuch as he is a Republican and an avowed high protectionist and he will be replaced by appointment under the Roosevelt administration. Frank Dow, Acting Commissioner, will head the bureau upon the departure of Captain Eble and until appointment of his successor.

Captain Eble presided at most of the hearings before the bureau regarding alleged dumping of steel. Decisions in these and many other important cases are pending.

National Foreign Trade Council will hold its next annual convention at Pittsburgh on April 26, 27 and 28.

Pig Iron Daily Output Off 16 Per Cent in December

DECEMBER production of coke pig iron was 546,080 gross tons, compared with the November total of 631,280 tons. The December daily rate at 17,615 tons showed a loss of 16.3 per cent from the November rate of 21,052 tons daily. The output for 1932 totaled 8,686,443 tons, against 18,275,165 tons for 1931, or a loss of 52.4 per cent.

Furnaces in operation on Jan. 1 numbered 42, making iron at the rate of 15,810 tons daily, against 51 on Dec. 1, with a daily operating rate of 20,860 tons. Ten furnaces were put out or banked during December and one blown in, making a net loss of nine furnaces. The furnace put in operation belonged to an independent steel company. Four merchant furnaces, four independent steel company furnaces and two Corporation furnaces were blown out or banked. Most of them were banked over the holidays and will probably resume shortly.

Among the furnaces blown out or banked are the following: A Donner furnace and a Pioneer furnace of the Republic Steel Corpn.; two furnaces of the Woodward Iron Co.; one Aliquippa, Jones & Laughlin Steel Corpn.; one Ohio furnace, Carnegie Steel Co.; one Toledo stack, Pickands, Mather & Co.; one Portsmonth stack, Wheeling Steel Corpn.; Jisco furnace, Jackson Iron & Steel Co.; one South Chicago unit, Illinois Steel Co. The M. A. Hanna Co. started up one of its Detroit furnaces.

Production by Districts and Coke Furnaces in Blast

Furnaces	Production (Gross Tons) December (31 Days)	Production (Gross Tons) November (30 Days)	Jan. 1 Number in Blast	Jan. 1 Operating Rate, Tons a Day	Dec. 1 Number in Blast	Dec. 1 Operating Rate, Tons a Day
New York:						
Buffalo	25,141	42,803	1	505	2	1,005
Other New York and Mass.	....	....	0	....	0	....
Pennsylvania:						
Lehigh Valley	17,642	19,859	2	570	2	660
Schuylkill Valley	13,111	7,979	1	425	1	345
Susquehanna and Lebanon Valleys	....	....	0	....	0	....
Ferromanganese	....	....	0	....	0	....
Pittsburgh District	89,884	120,224	7	2,760	8	3,765
Ferro. and Spiegel	2,209	2,196	1	70	1	75
Shenango Valley	6,502	8,534	1	210	1	285
Western Pa.	7,080	9,186	1	230	1	305
Ferro. and Spiegel	5,598	3,550	1	180	1	235
Maryland	24,355	28,205	2	785	2	940
Wheeling District	71,831	72,941	4	2,315	4	2,430
Ohio:						
Mahoning Valley	25,431	47,318	3	595	4	1,580
Central and Northern	77,517	82,403	5	2,245	6	2,745
Southern	12,237	21,184	1	290	3	790
Illinois and Indiana	103,448	100,349	7	3,055	8	3,345
Mich., Wis. and Min.	5,979	....	1	400	0	....
Colo., Mo. and Utah	4,312	4,243	1	140	1	140
Virginia	....	....	0	....	0	....
Kentucky	9,817	8,550	1	315	1	285
Alabama	43,986	51,756	2	720	5	1,930
Ferromanganese	....	....	0	....	0	....
Tennessee	....	....	0	....	0	....
Total	546,080	631,280	42	15,810	51	20,860

Daily Average Production of Coke Pig Iron

Gross Tons

	1932	1931	1930
January	31,380	55,299	91,209
February	33,251	60,950	101,390
March	31,201	65,556	104,715
April	28,430	67,317	106,062
May	25,276	64,325	104,283
June	20,935	54,621	97,804
½ year	28,412	61,356	100,891
July	18,461	47,201	85,146
August	17,115	41,308	81,417
September	19,753	38,964	75,890
October	20,800	37,848	69,831
November	21,042	36,782	62,237
December	17,615	31,625	53,732
Year	23,772	50,069	86,025

Merchant Iron Made, Daily Rate

1932	*Tons*	1931	*Tons*
January	6,256	January	9,416
February	7,251	February	11,332
March	7,157	March	11,481
April	5,287	April	13,439
May	4,658	May	13,212
June	6,090	June	11,209
July	3,329	July	12,012
August	3,070	August	9,569
September	3,213	September	8,985
October	4,286	October	7,051
November	4,435	November	5,758
December	3,674	December	6,778

Production of Coke Pig Iron and Ferromanganese

Gross Tons

	Pig Iron* 1932	Pig Iron* 1931	Ferromanganese† 1932	Ferromanganese† 1931
January	972,784	1,714,266	11,250	14,251
February	964,280	1,706,621	4,010	19,480
March	967,235	2,032,248	4,900	27,899
April	852,897	2,019,529	481	25,456
May	783,554	1,994,082	5,219	23,959
June	628,064	1,638,627	7,702	11,243
½ year	5,168,814	11,105,373	33,562	122,288
July	572,296	1,463,220	2,299	17,776
August	530,576	1,280,526	3,414	12,482
September	592,589	1,168,915	2,212	14,393
9 months	6,864,275	15,018,034	41,487	166,939
October	644,808	1,173,283	2,302	14,739
November	631,280	1,103,472	5,746	14,705
December	546,080	980,376	7,807	15,732
Year	8,686,443	18,275,165	57,342	212,115

*These totals do not include charcoal pig iron. The 1931 production of this iron was 46,213 gross tons.
†Included in pig iron figures.

Reinforcing Steel

Awards 3420 Tons—New Projects 1750 Tons

Owego, N. Y., 100 tons, State highway bridge, to L. L. P. Butts, Oneonta, N. Y.

Washington, 525 tons, United States Government central heating plant, to Rosslyn Steel & Cement Co.

Washington, unstated tonnage, building for Potomac Electric Power Co., to Rosslyn Steel & Cement Co.

Pasadena, Cal., 1150 tons, Pine Canyon Dam, to Pacific Coast Steel Corpn.

San Francisco, 1100 tons, Golden Gate bridge piers and fender, to Pacific Coast Steel Corpn.

San Francisco, 250 tons, pier No. 35 extension, to Pacific Coast Steel Corpn.

Lackawanna County, Pa., 220 tons, bridge, Pennsylvania highway route 439, to Kalinan Steel Corpn.

NEW REINFORCING BAR PROJECTS

Woodbourne, N. Y., 300 tons, State prison buildings.

Elmira, N. Y., 500 tons, reformatory.

San Francisco, 200 tons, psychopathic ward.

State of Nevada, 161 tons, highway structures in Clark and Pershing counties; bids taken Jan. 4.

State of Wyoming, 100 tons, highway structures in six counties; bids Jan. 5.

Iron Mountain, Mich., tonnage being estimated, highway bridge.

Coco Solo, Canal Zone, 300 tons, five apartment buildings; bids under advisement.

Philadelphia, 150 tons, viaduct, Market and Thirtieth Streets. Francis A. Canuso, Philadelphia, general contractor.

December Pig Iron Output Drops Close to August Low Point

Daily Rate, at 17,615 Tons, Compares with 17,115 Tons in Summer Month—Ingot Output for Week is 14 Per Cent

FINAL figures on pig iron production for December, as compiled from returns from producers, were even more discouraging than preliminary estimates. Output last month was 546,080 tons, or 17,615 tons a day, as compared with 631,280 tons, or 21,052 tons daily, in November. The daily average barely exceeded the depression low of 17,115 tons, reached in August, and showed a decline of 16.3 per cent from the November rate. Ten furnaces were put out or banked during December and one was blown in, making a net loss of nine stacks. Part of this loss in active furnaces is accounted for by holiday banking and will probably be offset by early resumptions.

Pig iron production for 1932 was 8,686,443 tons, the lowest output since 1896 and a decline of 52.4 per cent from the 1931 total of 18,275,165 tons.

Furnaces in operation on Jan. 1 numbered 42, making iron at the rate of 15,810 tons daily, compared with 51 active stacks on Dec. 1, producing at the rate of 20,860 tons a day.

ASIDE from increased tin plate specifications and heavier releases from the automobile industry, the new year opened with few indications of an impending seasonal rise in iron and steel bookings. Little replenishment buying has yet put in an appearance, although in Ohio some finished steel tonnage was placed for shipment on Dec. 31, thus permitting both seller and buyer to escape the State tax on inventories. Fabricated structural steel awards for the week were unusually large—67,000 tons—but this total was accounted for in large part by the formal award of 60,000 tons for a single project, the New Orleans Belt Line bridge. In general, structural steel prospects are regarded as less favorable than a year ago, in view of a probable decline in public works construction and the absence of a compensating increase in private building work.

Unless steel demand from miscellaneous sources shows a gain similar to that of last autumn, it seems likely that mills will remain, for some time, dependent on the motor car and container industries for their main support. These two influences are almost entirely responsible for a rise in steel ingot production from last week's rate of 13 per cent to a current average of 14 per cent. Among the steel producing districts, the Cleveland territory and the Valleys alone registered gains, the Cleveland rate rising from 26 to 35 per cent and the Valley average from 10 to 15 per cent. Detroit maintained its comparatively high rate of 34 per cent, and the Wheeling district continued on a 30 per cent basis, while Buffalo operations dropped from 16 to 12 per cent. Pittsburgh and Chicago operations remained unchanged at recent low levels of 12 and 9 per cent respectively.

THE motor car industry maintained its schedules through the holidays with little interruption, and its operations in January are expected to fulfill recent forecasts of an increase over those of December. The Chrysler Corpn. will shortly place steel for its requirements after Jan. 15, and this tonnage will further bolster the production of those mills which specialize in automobile materials. Chrysler's January schedule calls for about 25,000 cars, of which 15,000 will be Plymouths. Chevrolet's production will total approximately 55,000 cars, while the Ford company is reported to be going on a schedule this week of 1000 units a day five days a week.

THE price situation remains sensitive. Cold-rolled strip is more commonly available in large lots at 1.90c. a lb., or $2 a ton below the recent ruling minimum. No. 24 hot-rolled annealed sheets and No. 20 cold-rolled have been subject to more frequent concessions, and prices of plates and reinforcing bars continued unsettled, particularly along the Eastern seaboard.

A decline of 50c. a ton in heavy melting steel scrap at Pittsburgh brought down THE IRON AGE composite price for scrap steel to $6.75 a gross ton from $6.92 a week ago. The composite prices for finished steel and pig iron are unchanged at 1.948c. a lb. and $13.56 a gross ton respectively.

▲▲▲ A Comparison of Prices ▲▲▲

Market Prices at Date, and One Week, One Month and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron	Jan. 3, 1933	Dec. 27, 1932	Dec. 6, 1932	Jan. 5, 1932
Per Gross Ton:				
No. 2 fdy., Philadelphia	$13.34	$13.34	$13.34	$15.64
No. 2, Valley furnace	14.50	14.50	14.50	15.50
No. 2 Southern, Cin'ti	13.82	13.82	13.82	14.82
No. 2, Birmingham	11.00	11.00	11.00	12.00
No. 2 foundry, Chicago*	15.50	15.50	15.50	16.50
Basic, del'd eastern Pa.	13.50	13.50	13.50	16.25
Basic, Valley furnace	13.50	13.50	13.50	15.00
Valley Bessemer, del'd P'gh.	16.89	16.89	16.89	17.89
Malleable, Chicago*	15.50	15.50	15.50	16.50
Malleable, Valley	14.50	14.50	14.50	16.00
L. S. charcoal, Chicago	23.17	23.17	23.17	23.17
Ferromanganese, seab'd carlots	68.00	68.00	68.00	75.00

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

Rails, Billets, etc.				
Per Gross Ton:				
Rails, heavy, at mill	$40.00	$40.00	$40.00	$43.00
Light rails at mill	30.00	30.00	30.00	34.00
Rerolling billets, Pittsburgh	26.00	26.00	26.00	28.00
Sheet bars, Pittsburgh	26.00	26.00	26.00	28.00
Slabs, Pittsburgh	26.00	26.00	26.00	28.00
Forging billets, Pittsburgh	31.00	31.00	31.00	35.00
Wire rods, Pittsburgh	37.00	37.00	37.00	37.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.60	1.60	1.60	1.50

Finished Steel				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.60	1.60	1.60	1.50
Bars, Chicago	1.70	1.70	1.70	1.60
Bars, Cleveland	1.65	1.65	1.65	1.55
Bars, New York	1.95	1.95	1.95	1.85
Tank plates, Pittsburgh	1.60	1.60	1.60	1.50
Tank plates, Chicago	1.70	1.70	1.70	1.60
Tank plates, New York	1.898	1.898	1.898	1.798
Structural shapes, Pittsburgh	1.60	1.60	1.60	1.50
Structural shapes, Chicago	1.70	1.70	1.70	1.60
Structural shapes, New York	1.86775	1.86775	1.86775	1.768
Cold-finished bars, Pittsburgh	1.70	1.70	1.70	2.00
Hot-rolled strips, Pittsburgh	1.45	1.45	1.45	1.45
Cold-rolled strips, Pittsburgh	*1.90*	2.00	2.00	1.95

Finished Steel	Jan. 3, 1933	Dec. 27, 1932	Dec. 6, 1932	Jan. 5, 1932
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.10	2.10	2.10	2.25
Hot-rolled annealed sheets, No. 24, Chicago dist. mill	2.20	2.20	2.20	2.40
Sheets, galv., No. 24, P'gh	2.85	2.85	2.85	2.80
Sheets, galv., No. 24, Chicago dist. mill	2.95	2.95	2.95	2.90
Hot-rolled sheets, No. 10, P'gh	1.55	1.55	1.55	1.60
Hot-rolled sheets, No. 10, Chicago dist. mill	1.65	1.65	1.65	1.75
Wire nails, Pittsburgh	1.95	1.95	1.95	1.95
Wire nails, Chicago dist. mill	2.00	2.00	2.00	2.00
Plain wire, Pittsburgh	2.20	2.20	2.20	2.20
Plain wire, Chicago dist. mill	2.25	2.25	2.25	2.25
Barbed wire, galv., Pittsburgh	2.60	2.60	2.60	2.60
Barbed wire, galv., Chicago dist. mill	2.65	2.65	2.65	2.65
Tin plate, 100 lb. box, P'gh	$4.25	$4.25	$4.25	$4.75

Old Material				
Per Gross Ton:				
Heavy melting steel, P'gh	*$8.25*	$8.75	$8.75	$10.12½
Heavy melting steel, Phila	6.75	6.75	6.75	7.50
Heavy melting steel, Ch'go	5.25	5.25	5.25	7.75
Carwheels, Chicago	7.00	7.00	7.00	8.50
Carwheels, Philadelphia	8.00	8.00	9.25	11.50
No. 1 cast, Pittsburgh	9.50	9.50	9.50	10.00
No. 1 cast, Philadelphia	8.00	8.00	8.00	10.00
No. 1 cast, Ch'go (net ton)	6.25	6.25	6.25	8.50
No. 1 RR. wrot., Phila	7.50	7.50	7.50	9.50
No. 1 RR. wrot., Ch'go (net)	4.00	4.00	4.50	6.50

Coke, Connellsville				
Per Net Ton at Oven:				
Furnace coke, prompt	$1.75	$1.75	$1.75	$2.25
Foundry coke, prompt	2.50	2.50	2.75	3.50

Metals				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	5.00	5.00	5.25	7.37½
Electrolytic copper, refinery	4.75	4.75	4.87½	7.00
Tin (Straits), New York	*22.50*	22.80	22.55	20.75
Zinc, East St. Louis	3.12½	3.12½	3.12½	3.12½
Zinc, New York	3.49½	3.49½	3.49½	3.47½
Lead, St. Louis	2.87½	2.87½	2.87½	3.55
Lead, New York	3.00	3.00	3.00	3.75
Antimony (Asiatic), N. Y.	5.40	5.40	5.45	6.15

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

▲ ▲ ▲

▲▲▲ The Iron Age Composite Prices ▲▲▲

	Finished Steel	Pig Iron	Steel Scrap
Jan. 3, 1933	1.948c. a Lb.	$13.56 a Gross Ton	$6.75 a Gross Ton
One week ago	1.948c.	13.56	6.92
One month ago	1.948c.	13.56	6.92
One year ago	1.945c.	14.81	8.47
	Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot rolled strip. These products make 85 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel		Pig Iron		Steel Scrap	
	High	Low	High	Low	High	Low
1932	1.977c., Oct. 4;	1.926c., Feb. 2	$14.81, Jan. 5;	$13.56, Dec. 6	$8.50, Jan. 12;	$6.42, July 5
1931	2.037c., Jan. 13;	1.945c., Dec. 29	15.90, Jan. 6;	14.79, Dec. 15	11.33, Jan. 6;	8.50, Dec. 29
1930	2.273c., Jan. 7;	2.018c., Dec. 9	18.21, Jan. 7;	15.90, Dec. 16	15.00, Feb. 18;	11.25, Dec. 9
1929	2.317c., April 2;	2.273c., Oct. 29	18.71, May 14;	18.21, Dec. 17	17.58, Jan. 29;	14.08, Dec. 3
1928	2.286c., Dec. 11;	2.217c., July 17	18.59, Nov. 27;	17.04, July 24	16.50, Dec. 31;	13.08, July 2
1927	2.402c., Jan. 4;	2.212c., Nov. 1	19.71, Jan. 4;	17.54, Nov. 1	15.25, Jan. 11;	13.08, Nov. 22

No Early Rebound in Demand Looked for at Pittsburgh

▲▲▲

Ingot production remains at 12 per cent at Pittsburgh, but rises to 15 per cent in the Valleys.

* * *

Scrap market is weaker, with heavy melting grade off 50c. a ton.

* * *

Tin plate releases and automotive specifications remain the chief support of mill activity.

▼▼▼

PITTSBURGH, Jan. 3.—Orders for finished steel products in the last week have been at a very low rate, and local mills accumulated little tonnage for immediate rolling. Releases of bars, sheets and strip steel from the automotive industry and for tin plate have helped the situation to some extent, but the other large consuming industries have been generally dormant. It is too early to gage the extent of January demand, but steel makers see little concrete promise of any material expansion in business during the next 30 days.

Steel ingot production in the Pittsburgh district in the current week will again average about 12 per cent of capacity. Although not a recognized holiday in the industry, Monday saw no resumption of production, and some plants which have been inactive will not resume before Thursday. Ingot production in the Valleys and northern Ohio has regained some of the holiday losses, and is estimated this week at 15 per cent of capacity. Production in the Wheeling district, which was not seriously affected by the holidays, is unchanged from last week.

Pig Iron

Orders were extremely light in the last week of the year, and no new business of importance has been placed. Prices are unchanged.

Semi-Finished Steel

Occasional urgent orders from sheet and strip producers forced some of the billet and slabbing mills to operate last week. New business is lacking.

Rails and Track Accessories

Most of the carriers have postponed distribution of orders against recent first quarter inquiries. The Atchison, Topeka & Santa Fe is in the market for accessories to go with its recent rail order, but the business is not expected to come to this district.

Bars, Plates and Shapes

Structural and reinforcing bar awards have been light, but recent inquiries which will be acted upon this month promise a fair tonnage. Sizable orders from manufacturing consumers of heavy hot-rolled products are lacking, and the trend of specifications during January is not clearly discernible. Movement of merchant and alloy steel bars to the automobile industry kept up fairly well during the holidays, and there is prospect of further business in January.

Producers continue to quote bars, plates and shapes at 1.60c., Pittsburgh, but a reduction of $2 a ton to 1.50c., Pittsburgh, has been adopted by reinforcing bar makers. This quotation applies only on mill lengths, but is effective in the Cleveland and Buffalo territories, as well as in New England. In the New York and Philadelphia districts no change has been made in the price.

Tubular Goods

The pipe market has been affected by the usual holiday lull, and the district's capacity has generally been idle.

Wire Products

Not much tonnage for January delivery has appeared, and mills which had been down for the holidays are resuming production slowly. Prices are well maintained.

Sheets

With the exception of a few mills which ran through the holiday week as a result of rush orders from the automobile industry, sheet-making capacity in this and nearby districts has been largely idle in the last week. Some companies are resuming production this week, but have not accumulated enough capacity to promise more than a few turns. Efforts to advance the price of No. 24-gage hot-rolled annealed sheets to 2.20c., Pittsburgh, have not met with much success, and consumers who have been buying at 2.10c. have been covered for the first quarter in many cases. On the other grades of sheets recent prices are holding.

Tin Plate

Mill schedules last week were fairly well maintained, and current production averages about 30 per cent of capacity. Forward specifications are light, and many consumers have gone into the new year without contracting for their requirements.

Strip Steel

Tonnage accumulated in the last week or two has enabled producers to resume production, but orders for early January shipment have been very light. A few automobile companies have inquiries before the trade, which promise some tonnage during January. Prices are well maintained.

Scrap

After having been quoted at a nominal range for nearly a month, the market on No. 1 heavy melting steel has been established at a lower level. A number of small purchases at $8.25 by one consumer are possibly not representative of a tonnage market, but orders at this price probably totaled at least 2000 tons. Most dealers seem inclined to regard $8.50 as the top of the market, and railroad steel would certainly bring this figure. Some of the other grades reflect the weakness in heavy melting steel, but the absence of sales makes it difficult to establish a price. The January scrap lists of the large automobile companies are the heaviest in several months, and would seem to indicate a soft market on machine shop turnings and hydraulic compressed sheets. The monthly list of the Pennsylvania Railroad, closing Jan. 4, contains 29,500 tons of scrap, including 9300 tons of No. 1 heavy melting steel and 8000 tons of rails. In the Baltimore & Ohio list of 8500 tons, closing Jan. 9, 2000 tons of heavy melting steel is included.

Eaton, Rhodes & Co., Cincinnati agents in the sale of pig iron and coke, is being liquidated by F. R. Rhodes, who for the past five years has been sole owner. Greene Fenley, Jr., who has been with the company for some years, will continue to represent the producers whose product has been handled in the past by Eaton, Rhodes & Co. and will continue to use the firm's name. F. R. Rhodes will have offices with the new organization, but will have no official connection with it.

Orders were placed in November, 1932, for 293 steel boilers with 310,999 sq. ft., as against 379 boilers with 232,403 sq. ft. in October, according to reports received from 72 makers by the Bureau of the Census. Orders in the first 11 months of last year totaled 3427 boilers with 3,339,903 sq. ft., compared with 7271 boilers of 6,443,991 sq. ft. in the corresponding period of 1931.

Continental Market is Weaker as Cartel Negotiations are Resumed

Demand for British Iron and Steel Improves—Denmark Proposes Barter of Locomotives for Brazilian Products

LONDON, ENGLAND, Jan. 2 (*By Cable*).—Pig iron producers expect to increase output shortly. There have been small export sales of Cleveland iron and domestic consumers have bought for their spring needs.

Steel demand also shows slight improvement. Imports of foreign semi-finished steel have declined, with a resulting increased demand for British material. Export inquiries for tin plate are broadening and deliveries to domestic consumers are in good volume, with the consequence that prices are steadier. Minimum prices on galvanized sheets have advanced to £16 7s. 6d., c.i.f., India, with Indian import duty paid, and £10 10s., f.o.b., for other markets. Both quotations are on the basis of No. 24 gage corrugated bundles.

Cleveland pig iron producers are negotiating for a revival of a speculative market for pig iron, but the London Metal Exchange has not yet been approached.

British Prices, f.o.b. United Kingdom Ports

Per Gross Ton

Ferromanganese, export	£9
Billets, open-hearth	£4 17s. 6d. to £5 7s. 6d.
Black sheets, Japanese specifications	£10 15s.
Tin plate, per base box	15s. 9d. to 16s. 6d.
Steel bars, open-hearth	£7 17½s. to £8 7½s.
Beams, open-hrth.	£7 7½s. to £7 17½s.
Channels, open-hearth	£7 12½s. to £8 2½s.
Angles, open-hearth	£7 7½s. to £7 17½s.
Black sheets, No. 24 gage	£8 5s.
Galvanized sheets, No. 24 gage	£10 10s. to £10 15s.

Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £ at $4.86

Billets, Thomas	£2 1s.
Wire rods, No. 5 B.W.G.	£4 10s.
Black sheets, No. 31 gage, Japanese	£11 5s.
Steel bars, merchant	£2 7s. 6d.
Beams, Thomas	£2 3s.
Angles, Thomas, 4-in. and larger.	£2 6s. 6d.
Angles, small	£2 8s.
Hoops and strip steel over 6-in. base	£3 10s.
Wire plain, No. 8	£5 7s. 6d.
Wire nails	£5 10s.
Wire, barbed, 4-pt. No. 10 B.W.G.	£8 15s.

The Lancashire Steel Corpn. has acquired the White Cross Co. and is now erecting a new continuous wire rod mill.

Continental gold prices are weak on falling demand and there is anxiety on the part of some works to book orders. Upper Silesian plants expect to book 15,000 tons of steel for Brazil. Denmark has offered to barter locomotives for Brazilian coffee, tobacco and fruit. The Continental Raw Steel Cartel will resume negotiations at Brussels, Jan. 11. The Franco-Belgo-Luxemburg-German hoop and tube strip cartel has been agreed upon in principle and awaits confirmation by each nation.

Better Year for Steel Forecast by E. T. Weir

"The consumption of steel in 1933 may not be much larger than in 1932, but the industry has some expectation that stabilized conditions, increased efficiency and a broader attitude on the part of buyers may improve the profits position," said Ernest T. Weir, chairman of the board, National Steel Corpn., in commenting on the business outlook for the coming year. "It is not likely that the principal consumers of steel will take less in 1933 than in 1932, while there are indications that consumption may be increased. Meanwhile, the industry is steadily concentrating its production in its most efficient units, modernizing and replacing to meet the demands of depreciation and obsolescence, and stabilizing its marketing situation.

"The steel industry is no exception to the rule that periods of depression afford the best opportunities for developing new products and methods to replace lost business. Many companies are rounding out and diversifying their output by adding new products. Much pioneer work is being done on new production methods and new and improved units of equipment are being installed.

"A small increase in the activity of the steel industry will substantially benefit many other industries. Between 4 and 5 tons of material must be moved to produce a ton of steel, with the consequent production of revenues for transportation lines and wages for many groups of employees outside the steel industry. The profit on a ton of steel is so small that almost the entire purchase price is immediately passed along to steel mill workmen, railway men, miners, machinery makers and purveyors of many kinds of commodities and services."

Census Report Issued on 1931 Rolled Steel Output

WASHINGTON, Jan. 3.—The output in 1931 of a number of rolling mill products and related lines has just been made public in a special report by the Bureau of the Census. The principal items covered, with comparable figures for 1929 in parentheses, follow: Wrought pipe and tubes, $200,345,394 ($455,276,528); bolts, nuts, rivets, washers, etc., $50,999,705 ($126,507,797); galvanized plates, sheets, and strips, $49,810,801 ($103,929,658); ball and roller bearings and parts, $49,169,653 ($120,033,812); cold-rolled strip steel, $41,261,931 ($83,647,021); cold-finished steel bars, $24,720,399 ($71,755,645).

Among comparable figures on quantity production are the following: Plain galvanized plates, sheets and strips, 444,654 gross tons (959,524); galvanized corrugated or crimped, 262,307 gross tons (306,423); corrugated or crimped sheets, not galvanized, 3026 gross tons (5285); wrought welded boiler tubes, 16,939 gross tons (40,628); oil country casing, tubing and pipe, 151,640 gross tons (888,338); other black pipe made in rolling mill industry, 465,115 gross tons (493,330); other black pipe not made in rolling mill industry, 263,128 gross tons (531,289); galvanized pipe, made in rolling mill industry, 192,723 (402,497); galvanized pipe, not made in rolling mill industry, 116,673 (171,929); seamless boiler tubes, 70,784 (185,369); seamless oil country casing, tubing and pipe, 568,733 (882,732); other seamless black pipe and galvanized pipe, 12,788 (31,792); cold-rolled strip steel, flat bright, except cold rolled from drawn wire, all industries, 465,372 (952,812).

Rubber pulley lagging increases the coefficient of friction between a rubber belt and a dry pulley face about 20 per cent, states a recent trade publication of the B. F. Goodrich Rubber Co., Akron, Ohio. It is recommended for drive pulleys on belt conveyors and bucket elevators to improve pulley grip and prevent slipping. The publication also discusses elevator bucket washers, which, placed over the bucket bolts, provide open spaces that prevent fine material collecting and wedging the buckets.

"Creep at Elevated Temperatures in Chromium-Vanadium Steels Containing Tungsten or Molybdenum" is the title of Research Paper No. 481, published by the Bureau of Standards, Washington. The authors are William Kahlbaum and Louis Jordan of the Bureau.

Chicago Steel Output Holds at 9 Per Cent; Pig Iron Releases Are Encouraging

▲▲▲

Chicago steel plants start the year with operations at 9 per cent, unchanged from a week ago.

* * *

Steadiness of late December steel bookings has raised hopes of an upturn in business before the end of this month.

* * *

With public construction apparently on the wane, private projects show no signs of giving support to the structural steel market.

▼▼▼

CHICAGO, Jan. 3.—Chicago steel makers are starting the year with an operation of close to 9 per cent of ingot capacity and with the prospect that improvement may come before the end of the month. Order mails in late December showed rather remarkable steadiness in the face of inventory taking and consumers' determination to hold stocks at the minimum. In some respects, prices for finished steel are less clearly defined, though no major changes have taken place in this territory.

Boat shipments to Chicago from Lake Erie were only 15 per cent as heavy in 1932 as in the previous year and the finished steel movement by boat from Chicago was correspondingly light.

In the structural field, investment and industrial types of buildings are still notable for their absence, and it is generally believed that public work in 1933 will be lighter than in the year just passed.

Pig Iron

The trade still holds to the opinion that January shipments will show improvement over December. Sales have been rather steady in recent weeks and releases for January shipments are distinctly encouraging. Tuesday's order mails were in general light, but this was to be expected because of the prolonged holiday in most offices. Prices remain steady at $15.50, furnace, for Northern iron. Only one merchant stack is active.

Reinforcing Bars

Shop operations in 1932 did not average above 20 per cent of capacity whereas in 1931 the rate was close to 50 per cent. Prices in October reached the lowest in many years, due in part to dealers' liquidation of stocks. As the year closed quotations appeared to have reached a solid low bottom. Promises for the early part of 1933 rest almost wholly on road bars, lettings for which were made late in the old year. Little tonnage can be expected in the near future from the speculative type of structure and industrial building.

Sheets

Soft spots as to prices are developing to the east and south of Chicago, but they have not made their appearance in a serious way in the local area. Producers go into the new year with meager backlogs, and January specifications are too light to afford more than a few turns of operations each week.

Structural Material

Though building awards are somewhat numerous, speculative and industrial-type projects are lacking. Bridge work is pending in Illinois and neighboring States, but the tonnage is not large. The amount of public work that will be undertaken this year cannot now be gaged, but opinion is that it will not run so heavy as in 1932.

Plates

The center of interest in this market is an inquiry for 5000 tons for a Denver, Colo., pipe line. This project comes up Jan. 7. Tank fabricators start the year with shops practically empty. Railroad equipment business is at a standstill.

Wire Products

The new year opens with production at about 20 per cent, which is lower than a year ago when some mills were attempting to furnish as much employment as possible. By matching production closely with shipments producers this year are holding down mill stocks.

Rails and Track Supplies

The bulge in demand for track accessories, noted a week ago, is still in evidence. There are no prospective rail purchases before the trade at this time. Mills have light schedules, which will continue for several weeks.

Bars

Automobile manufacturers are leading the field in the use of steel, and the benefit to bar mills is marked. Specifications from farm implement manufacturers are light, but there is still prospect of improvement early in the new year. Rail steel bar shipments in 1932 were about 55 per cent of the total in the previous year. Road and bridge work accounted for a large part of the tonnage.

Scrap

Late in the old year steel mills cut heavily into scrap piles, and dealers are inclined to view this situation as one which will tend to strengthen prices as soon as these users again come into the market. Dealers point to the fact that at present price levels scrap is difficult to obtain. Nineteen hundred and thirty-two marked the first boat shipments of heavy melting steel from Chicago. Several cargoes of borings also left local docks. Chicago mills took only 35 per cent as much heavy melting steel in 1932 as in the previous year.

Buffalo Pig Iron Orders Show a Slight Spurt

BUFFALO, Jan. 3.—About 2000 tons of pig iron was sold in the past week in this territory. Producers are encouraged by an increase in the volume of small lots, ranging from carloads to 200 tons. The Republic Steel Corpn. has banked a furnace which has been operating on reduced blast.

Steel

Bethlehem's Lackawanna plant has three open-hearth furnaces in service this week. Republic Steel ran two furnaces for four days last week, but probably will not operate any this week. Wickwire Spencer is operating one. The reinforcing bars in the State hospital at Gowanda, N. Y., reported last week at 500 tons, actually total about 900 tons. The Elmira reformatory will require 500 tons of bars.

Scrap

A plant which purchased No. 2 heavy melting steel in December, 1931, has released 2000 tons for shipment in January. This material was purchased for $6.50 a ton. Activities of brokers, either on actual orders or expectation of same, have led to a firming of the market. All prices are nominal.

Detroit Scrap Quiet

DETROIT, Jan. 3.—The local scrap market is quiet, but the underlying tone is somewhat better.

Cleveland Steel Output Rises to 35 Per Cent of Capacity

Additional Releases Came From Automobile Industry Which Maintained Operations Through Holiday Period

CLEVELAND, Jan. 3.—The volume of business in finished steel was very light during the past week. However, additional releases came from the motor car industry, which maintained its schedule during the holiday period with little interruption. Some finished steel orders were placed for shipment on Dec. 31, permitting both seller and buyer to escape the Ohio tax on inventories, the tax not being applicable to material in transit on Jan. 1. Nevertheless many consumers postponed the placing of orders until the new year, and a moderate gain in small-lot business is expected this week.

Ingot output was stepped up in Cleveland this week to 35 per cent of capacity, a gain of nine points by the addition of three open-hearths. However, the American Steel & Wire Co., which put on two open-hearths, shut down its Bessemer converter.

While a gain in the demand for finished steel is looked for in 1933, there is not much expectation of an improvement before spring. As the automotive industry is the main source of business in this territory, steel business in the next few weeks will depend largely on the activity of that industry. Activity in the structural field is still confined almost wholly to public work, either highway bridges or post offices. Demand from railroads continues very light. The Chesapeake & Ohio is expected to issue shortly its inquiry for 1933 rails but probably will purchase a considerably smaller tonnage than last year.

Steel prices are being well maintained on most products, although there has been little test of quotations for the present quarter. This is particularly true of sheets, which are likely to be subjected to severe pressure.

Pig Iron

As buying during the past quarter was restricted to early needs, producers have carried over little iron, and stocks in furnace yards are very low. Consequently an improvement in foundry operations should be reflected rather quickly in a better demand. One producer shipped nearly as much iron in December as in November, its orders being well maintained owing to the demand from automobile foundries. Shipments by other furnaces declined considerably last month. Sales during the week were confined to car lots for immediate requirements. Prices are steady at $15 for foundry and malleable iron for local delivery and $14 to $14.50 for outside shipment.

Strip Steel

Additional releases of fair-sized lots of hot-rolled strip were issued during the week by General Motors accessory manufacturing units. These indicate that the January output of lamps and starting equipment will equal and possibly exceed that of December. A fair number of first quarter contracts have been placed. The market is firm at 1.45c., Pittsburgh. Cold-rolled strip ranges from 1.90c. to 2c., Cleveland, larger consumers securing the lower price. Some contracts for the current quarter have been taken at these prices.

Bars, Plates and Shapes

Little new business in these products was placed during the week. New inquiry in the structural field is only for small lots. The Cleveland Electric Illuminating Co. has placed 240 tons for a plant addition, and the William F. Hendrich Co., Cleveland, has been awarded the general contract for the Elmira, N. Y., reformatory, requiring 720 tons. While fabricated work is bringing very low prices, structural material appears to be well maintained at regular quotations. Bars and plates also are being held at regular prices.

Sheets

Some of the mills are still able to maintain fair operating schedules because of recent releases by automobile manufacturers. However, little new business was placed during the week. Some new inquiries are pending from automotive sources, which are expected to result in orders this week. A Youngstown mill quoted a low price of 2.23½c., delivered, for 1000 tons of one-pass cold-rolled pickled and annealed sheets for Ohio automobile license tags, for which bids were taken Dec. 30. This is equivalent to 2.01c., Pittsburgh, and, based on the regular pickling extra, the price is $10.80 a ton below the regular hot-rolled annealed price. While some other bidders made concessions, several held to the 2.20c. base.

Scrap

The market was virtually at a standstill during the past week. Small-lot shipments against contracts were taken by some of the mills, but there is no new demand. Some consumers start the year with fair-sized stocks, considering present steel plant operations, and others are carrying very little scrap. Prices are nominal.

Only Two Blast Furnaces in Alabama Now Active

BIRMINGHAM, Jan. 3.—Only two blast furnaces are now in operation in Alabama. The Republic Steel Corpn. banked its furnace on Saturday, Dec. 31, and earlier in the month, as previously reported, Woodward Iron Co. banked two. The Republic furnace will probably remain banked for two months or more. With the exception of August, when there were also only two stacks in blast, furnace operations have not been so low in more than 10 years. The two producing furnaces are Fairfield No. 6 of the Tennessee company, on basic, and No. 2 furnace of Sloss-Sheffield Steel & Iron Co., on foundry. The iron market was especially quiet last week. Some of the local foundries did not reopen until Jan. 2. The prospects for January are not encouraging. Pipe plants have little tonnage ahead and are subsisting mostly on current bookings. Pig iron quotations are holding at $11, base, for the Southern market.

Steel

December bookings of one steel producer were slightly ahead of those of November, while another did not quite equal its sale of the previous month. Some of the fabricators also had small gains. In general, though, the market has been dull since the middle of last month and buying has been restricted to routine requirements. January gives promise of being a better month, even if there is nothing but routine business. The railroads have bought little, and the Tennessee company has no plans for reopening the Ensley rail mill. Five open-hearths are still active, the same number as for the past month, with the exception of a few days at Christmas, when three were shut down.

Cincinnati Market Dull

CINCINNATI, Jan. 2.—Inventories and the holiday period further deadened the district pig iron market the past week. Scattered sales of carload lots totaled less than 400 tons. Foundry operations are low, but the trade is facing the new year hopefully.

Scrap

The scrap market is almost at a standstill. New business is lacking, but small amounts of old material are moving on contract. Prices are nominal.

Eastern Pennsylvania Steel Output Pointed Upward

Ingot Production, Still at 10 Per Cent, Expected to be Stepped Up in Coming Week

PHILADELPHIA, Jan. 3.—The new year finds the iron and steel market in the eastern Pennsylvania district at an almost complete standstill. This had been anticipated. Recovery from the holiday and inventory season is not expected to make itself felt for a week or 10 days. By that time the consumers' position will have become better defined and resumption of buying on a light scale is looked for. Aside from requirements for the automotive field, it is not thought any substantial buying will develop before spring.

Some makers in this district report that orders in December were somewhat heavier than they were in November. Generally, however, December business was lighter than that of November. Replenishing of inventories, along with requirements for immediate use, is looked for soon and is expected to bring January bookings up to the November level.

Steel works operations remain at about 10 per cent of capacity. The rate will be stepped up next week when, according to present plans, additional capacity will be put into operation.

Pig Iron

Inquiries are confined to carlots. While some melters are replenishing stocks, the principal movement covers tonnage for immediate use.

Plates, Shapes and Bars

The market remains sluggish and irregular. Merchant bars show more strength than either plates or shapes. Sharp concessions are still reported in both of the latter lines and producers are making additional efforts to cut down costs in order to reduce their losses. The Virginia Ferry Corpn. opened bids today in New York for a ferry which will require 700 tons of plates.

The American Bridge Co. was low bidder on fabricated steel for a highway bridge over the Hackensack River near Rutherford, N. J., requiring 2300 tons.

Francis A. Canuso, Philadelphia, was awarded the general contract for the viaduct at Market and Thirtieth Streets, Philadelphia. The project will require 750 tons of structural and 150 tons of reinforcing steel. The Kalman Steel Corpn. was awarded 220 tons of reinforcing bars for a highway bridge in Lackawanna County, Pa.

Sheets

The two Philadelphia automobile body building plants have increased releases of sheet steel somewhat. Further stimulus is expected in the near future. It is reported that the Edward G. Budd Mfg. Co. will begin large-scale production on the Plymouth about the middle of the month.

Warehouse

Jobbers report an almost complete absence of demand. Prices are unchanged.

Imports

Imports received here last week included 4666 tons of pig iron from England and 5 tons of hollow drill steel from Norway.

Old Material

The market is dull. Movements to mills have been light. An interesting trend in mill practice in this district is toward greater use of No. 2 heavy melting steel to replace the higher priced No. 1 material as a means of further economy and of meeting the intensifying competition.

Construction Active in Southern California

SAN FRANCISCO, Dec. 31.—Work on the $78,000,000 Colorado River Aqueduct is definitely getting under way, with the contract for the San Jacinto tunnel already awarded, and bids are to be taken shortly after the first of the year for the Valverde, Bernasconi and the East and West Coachella tunnels, requiring 570 tons of structural steel and 278 tons of reinforcing bars. Bids will also be called for 40 miles of 5, 6, and 8-in. pipe line. It is estimated that a total of $17,600,000 will be expended by the Metropolitan Water District of Los Angeles during 1933. Bids will be called for other units in the project in the near future.

A recent survey of probable building construction in southern California during 1933 shows projects totaling $6,540,800 for which contracts have been awarded and which are just being started or will be started during the coming year. Post office buildings for which appropriations have been made total $4,624,500. There are in view projects with an estimated cost of $13,551,350 for which working plans have been ordered, projects totaling $1,956,000 which are in the architectural sketch stage. It is expected that, with favorable conditions, projects involving an estimated cost of $19,121,000 may go ahead; these, however, have not yet reached a definite stage.

New England Melter Buys Foreign Pig Iron

BOSTON, Jan. 3.—The General Fire Extinguisher Co., Auburn, R. I., notified domestic furnace representatives that it purchased foreign iron against its recent inquiry for 500 tons. The assumption is that Dutch iron was purchased, there being a fairly large stock of such iron in Providence, R. I. Otherwise the local market was without feature, aggregate bookings falling below 500 tons.

The scrap market marked time with the ending of 1932. Apparently there is little business in sight, but the trade is optimistic, believing that buying will start this month and that available stocks of scrap in New England are well below normal.

Steel Output at Low Point as Buying Lags

ST. LOUIS, Jan. 3.—Buying of pig iron for first quarter requirements has amounted to very little, as melters are waiting for orders for their own products before making any commitments. Despite the small amount of business being placed, prices are unchanged.

Open-hearth operations are said to be about 4 per cent of capacity, which is believed to be the lowest point ever reached in the St. Louis industrial district.

A negligible amount of business in plates, shapes, bars and sheets was placed during the week, little interest being shown in first quarter requirements.

Offerings of scrap by the railroads centering here have been exceedingly light during the last few weeks because of the low prices prevailing. The Pennsylvania Railroad has issued a list of 28,500 tons. There was virtually no consumer buying of scrap during the week. Prices on railroad springs and rails for rolling have declined 25c. a ton.

Bi-monthly examination of the books of mills working in agreement with the Amalgamated Association of Iron, Steel and Tin Workers and the Western Bar Iron Association disclosed an average sales price in November and December of 1.45c. a lb., which was a decline of 5c. a 100 lb. from the September-October period.

Tin Plate Releases Increase Mill Bookings in New York Area

January Rise in Steel Demand Looked for—Prices on Plates, Reinforcing Bars and Sheets Unsettled

NEW YORK, Jan. 3.—Bookings of several New York steel sales offices were larger in December than in November. Some offices also report that sales in the final week of the year were larger than in any previous week of December, but such year-end increases were to a large extent influenced by tin plate specifications. The largest tin plate user has not yet signed 1933 contracts, owing to uncertainty as to the amount that will be required, but most of the smaller consumers have concluded contract coverage.

Steel sales executives are confident that January orders will be larger than those of December. However, the first business day of the new year did not bring in much tonnage.

The new year starts out with a somewhat unsettled price situation. On plates and reinforcing bars in particular there are frequent departures from open market quotations. Sheet quotations are subject to occasional concessions, No. 20 gage cold-rolled having been sold at 2.40c. a lb., or $2 a ton below the nominal asking price. In fact, 2.40c. was bid to the New York Central last week by one mill, which also put in a price of 2c., mill, on No. 24 gage hot-rolled annealed sheets. Other mills quoted 2.10c. or 2.20c.. Some contracts for No. 24 gage hot-rolled annealed for first quarter have been made with miscellaneous consumers at 2.10c., Pittsburgh, and it appears that the recently announced advance of $2 a ton to 2.20c. will not become effective except, perhaps, to very small buyers. The New York Central bids developed prices on plates as low as 1.70c., Newberry Junction; 1.50c., Granite City, Ill., and 1.60c., Chicago.

Pig Iron

The trade faces the new year with a practically clean slate. Few long-term contracts remain in force, and foundry stocks are generally inadequate to satisfy the current operating rate. Even a slight pick-up in orders for castings would therefore immediately quicken demand for pig iron. Despite the favorable technical position of the market, sentiment is dampened by the absence of tangible business factors. Transactions in the holiday week involved only 800 tons, bringing aggregate bookings for December to about 3800 tons, probably the smallest monthly volume for the year. The only specific inquiry before the trade involves 100 tons of low phosphorus iron for shipment to the Government at the Canal Zone. Prices are untested in a market limited to carlot trading.

Reinforcing Bars

Specifications have been issued for about 300 tons of bars for a group of state prison buildings at Woodbourne, N. Y. Important lettings for the week were lacking. The Pittsburgh base price of 1.75c. a lb., equivalent to 2.10c., delivered New York is unchanged.

Scrap

Consumer interest in scrap remains dormant. Mill operations in the East are sporadic and the uncertainty surrounding future operating schedules tends to defeat hopes of an early revival of scrap buying. Trading in the past week was virtually at a standstill, with prices remaining stationary.

Protests Filed Against Crane Service Charge

WASHINGTON, Jan. 3.—The Institute of Scrap Iron and Steel, along with numerous other organizations, has filed a complaint with the Interstate Commerce Commission asking for cancellation of railroad tariffs making charges for crane service. The tariffs became effective Oct. 22, 1932, and followed a decision by the commission justifying charges of 50c. per ton with a minimum charge of $5 per car. The institute complaint is directed against charges for the loading and unloading of freight by crane in the New York area. It is requested that the service be performed without charge as was done previous to the filing of the existing tariffs.

Plans Comprehensive Annual Meeting

The annual meeting of the Society of Automotive Engineers, which will be held at the Book-Cadillac Hotel, Detroit, Jan. 23 to 26, embraces 12 technical sessions, a business meeting, a students session, and a dinner, at which the Detroit section of the society will be host.

Technical sessions include discussion of motor coaches and motor trucks, aircraft and aircraft engines, including Diesels, passenger cars, bodies, chassis and streamlining. A visit to the University of Detroit aeronautical laboratory is scheduled for the afternoon of Jan. 23.

Papers at the production session Jan. 26 are: "Some Principles of Flexible, Accurate, Low-Cost Tooling," by J. E. Padgett, Spicer Mfg. Corpn., and "Automotive Aspects of Work of the Committee on Rehabilitation of Industry," by Col. J. L. Walsh, Guardian-Detroit Union Co. The session will be preceded by a luncheon at which K. T. Keller, Chrysler Corpn., will speak on "Production, a Human Equation."

"Load Carrying Capacity of Extreme Pressure Lubricants," by S. A. McKee, and "Friction Data in the Region of Thin Film Lubrication," by O. C. Bridgeman, Bureau of Standards, will be presented at a session on fuels and lubricants.

Scrap Bids Submitted on Shipping Board Vessels

WASHINGTON, Jan. 3—The Union Shipbuilding Co., Baltimore, submitted a bid of $1.06 per gross ton of recoverable scrap for all of the 40 obsolete Shipping Board vessels which are to be dismantled. This was the only bidder offering to dismantle all of the ships offered. Other bids were: Sun Shipbuilding & Drydock Co., Chester, Pa., $1.25 per ton for 10 vessels; N. Block and L. Chenman, Norfolk, Va., $1.47 per ton for 12 vessels.

Machinery Production Covered in Census Report

WASHINGTON, Jan. 3.—A special presentation of statistics for the broad group of products covered by the general designation, "machinery," has just been announced by the Bureau of the Census and gives the 1931 output as $2,860,592,830, compared with $6,609,907,686 in 1929.

Included in the figures are the following:

	1931	1929
Agricultural machinery	$49,954,270	$167,673,051
Aircraft	22,215,654	51,502,120
Cement and concrete	7,353,165	19,924,105
Concrete mixers	4,316,386	11,404,923
Cranes, hoists and derricks	18,353,248	57,839,874
Dredging, excavating and road building	57,400,775	91,438,354
Electrical	137,307,518	285,974,236
Elevators and elevator machinery	20,407,463	44,044,399
Steam and internal combustion engines	146,808,170	401,748,424
Locomotives and parts	23,817,780	91,973,945
Machine tools	56,368,822	186,373,954
Motor vehicles	1,380,365,064	3,412,055,752
Oil well machinery	23,105,131	89,067,149
Pneumatic machinery, exclusive of pneumatic tools	15,630,824	41,374,404
Refrigerating and ice-making	156,965,657	179,338,001
Textile machinery and parts	61,061,417	115,525,123
Welding machines and apparatus	10,558,992	13,698,778

Fabricated Structural Steel

Awards 67,010 Tons—New Projects Total 29,833 Tons

STRUCTURAL steel lettings, at 67,010 tons, were swelled by the formal award of 60,000 tons for the New Orleans Belt Line bridge, divided between the two largest fabricators. This total compares with lettings of 11,250 tons last week and 9925 tons two weeks ago. Inquiries, at 29,833 tons, compare with 3800 a week ago and 10,500 tons a fortnight ago. The largest new project is 21,000 tons for St. John's terminal in New York City for the New York Central.

NORTH ATLANTIC STATES

Sunbury, Pa., 225 tons, highway bridge, to McClintic-Marshall Corpn.

State of New York, 1200 tons, highway bridge in Tioga County, to American Bridge Co.

Lycoming County, Pa., 570 tons, highway bridge, to American Bridge Co.

THE SOUTHWEST

Marked Tree, Ark., 900 tons, bridge, to American Bridge Co.

Kingfisher County, Okla., 150 tons, bridge, to J. B. Klein Iron & Foundry Co.

THE SOUTH

New Orleans, 60,000 tons, Belt Line Bridge, 40,000 tons, approaches, to McClintic-Marshall Corpn.; 20,000 tons, span, to American Bridge Co.

CENTRAL STATES

Big Rapids and Port Austin, Mich., 250 tons, state highway bridge, to Whitehead & Kales Co.

Columbia County, Wis., 135 tons, beam bridges, to Worden-Allen Co.

Cleveland, 240 tons, extension for Cleveland Electric Illuminating Co., to American Bridge Co.

WESTERN STATES

Denver & Salt Lake Railroad, 1500 tons, bridges on Dotserro cut-off, to American Bridge Co.

Bonners Ferry, Idaho, 700 tons, State highway bridge, to American Bridge Co., previously reported to Pittsburgh-Des Moines Steel Co.

State of Colorado, 1550 tons, Rock Creek and Eagle River bridge, to American Bridge Co.

Mount Harris, Colo., 205 tons, bridge, to Mid-West Steel & Iron Co.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Littleton, N. H., 100 tons, post ofice.

New York, 21,000 tons, St. John's freight terminal, for New York Central Railroad.

New York, 400 tons, Women's National Republican Club.

New York, 500 tons, business building in Bronx.

Woodbourne, N. Y., 450 tons, State prison.

Rutherford, N. J., 2300 tons, highway bridge over Hackensack River. American Bridge Co., low bidder.

Philadelphia, 750 tons, viaduct at Market and Thirtieth Streets. Francis A. Canuso, Philadelphia, general contractor.

State of Maryland, 900 tons. Chop Tank River bridge at Preston.

CENTRAL STATES

Iron Mountain, Mich., tonnage being estimated, highway bridge.

Akron, Ohio, 133 tons, Park Avenue bridge, for Pennsylvania Railroad.

THE SOUTHWEST

Blair, Okla., 560 tons, highway bridge.

WESTERN STATES

Denver, 4500 tons, steel conduit for Moffatt water tunnel.

Everett, Wash., 250 tons, four highway bridges for United States Bureau of Public Roads.

Uintah County, Utah, 402 tons, State highway bridge and approaches over Green River near Jensen; bids Jan. 9.

Los Angeles, 375 tons, supports for Valverde and Bernasconi tunnels; bids to be called Jan. 20 by Metropolitan Water District.

Los Angeles, 195 tons, supports for East and West Coachella tunnels; bids to be taken soon by Metropolitan Water District.

CANAL ZONE

Coco Solo, 100 tons, navy station shop extension; bids to be called Jan. 25.

FABRICATED PLATE

AWARDS

Wellsville, N. Y., 210 tons, three bubble towers for Sinclair Refining Co., to Struthers-Wells Co.

State of Massachusetts, 120 tons, elevated tank for supervising engineers, to Pittsburgh-Des Moines Stuctural Steel Co.

NEW PROJECTS

Seattle, 200 tons, for lighthouse tender Henlock; bids under advisement.

New York, 700 tons, plates for ferry; bids opened at New York Jan. 3 by Virginia Ferry Corpn.

"Technocracy" Overlooks Jobs Created by New Industries, Says Dr. Klein

WASHINGTON, Jan. 3.—"Technocracy," which he defines as "the job-destroying dangers of machinery," does not conjure up any horrors for Dr. Julius Klein, Assistant Secretary of Commerce.

In a radio broadcast New Year's night Dr. Klein briefly summarized the business situation of the past few years and paid his compliments to technocracy. Giving approval to a report by Frederick C. Mills to the National Bureau of Economic Research, Dr. Klein cited the fact that the volume of employment in the manufacturing industries in the 1922-1929 period, notwithstanding the tremendous expansion of machine-usage and consequent dislocation of some industries, not only failed to fall off but actually increased by 1 per cent per annum. Meanwhile, it was pointed out, per capita real wages of manufacturing workers increased 1.4 per cent per annum.

"While this forward march has been temporarily stopped," said Dr. Klein, "it would be a foolhardy person who would predict that the next decade will not bring forth changes just as marked, and I have confidence that the costly lessons learned by industry during the past three years will have a profoundly sobering effect that will endure."

He predicted a continued trend toward shorter hours of work, stating that it is one way of taking care of the surplus workers resulting from the advent of labor-saving machinery.

"But there are other solutions to that problem which seem to be overlooked by the sensation-seeking alarmists," declared Dr. Klein. "Some of these critics claim that even if we go back to the 1929 scale of production it is probable that only about half of the present unemployed of the country can be put to work. There is no adequate proof of the subtle implications of that amazing statement. It overlooks, for one thing, the important fact that new industries are constantly springing up to care for the steadily expanding wants of consumers—industries which mean not only new factory jobs that never existed before, but an even greater, vastly greater, number of service jobs attending to the wants of those new products."

Upon leaving the Department of Commerce "on or before March 4," Dr. Klein will begin a survey of the business of the United Cigar Stores Co. and the Whelan Drug Co.

Gray Iron Production Declined in November

Output of gray iron castings declined over four points in November and new business declined over six points as compared with October, according to the monthly report of the Gray Iron Institute. However, the volume of new business was nearly two points above that of November, 1931. Production in November was 36 per cent of normal as compared with 40.9 per cent in October. New business was 28.2 per cent of normal as against 34.7 per cent during the previous month. Production increased in November in the district comprising Pennsylvania, Ohio, Michigan and Indiana, but declined in all other districts.

The annual banquet of the Society of Automotive Engineers will be held at the Hotel Pennsylvania, New York, on Wednesday evening, Jan. 11, instead of earlier, as previously announced. Speakers will include Bancroft Gherardi, vice-president, American Telephone & Telegraph Co., and Roy Faulkner, president, Pierce-Arrow Sales Corpn. Charles F. Kettering, vice-president and director of research, General Motors Corpn., will be toastmaster.

Tin Lower as Other Non-Ferrous Prices Remain Unchanged in a Dull Market

NEW YORK, Jan. 3.—The stagnation which has pervaded the copper market for several weeks has persisted. There has been very little domestic demand, but prices have continued firm, with electrolytic copper quoted at 5c. for the first quarter and at 5.12½c. for the second quarter, delivered Connecticut basis. Lake copper is unchanged at 5c., New York. A little business has been done possibly at slight concessions, but the policy of most producers has been to maintain quotations. There was a little activity in the foreign market last week, with sales from 5.10c. to 5.20c., c.i.f. Today the market is quiet at 5.15c. Prospects for the new year are confused, due to the international situation as to controlled production. With stocks at high totals, there are predictions that there must be extensive curtailment of output by American producers.

Tin

With the exception of some light buying by consumers on Friday for delivery early in January, the market has been dead. Prices have again hovered around a common level of about 22.75c., New York, for spot Straits, the quotation today being 22.50c. London quotations today were £147 17s. 6d. for spot standard, £148 15s. for future standard and £153 2s. 6d. for spot Straits. The Singapore price today was £153 12s. 6d. All these quotations are about £1 per ton less than those of Dec. 20. December statistics show that 2645 tons were delivered into American consumption. This is disappointingly low. There was a decrease last month of 1325 tons in the world's visible supply, which now stands at 45,125 tons. The December increase in tin carried over at the Straits was 888 tons, bringing the total on Jan. 1 to 10,330 tons. A more active market is anticipated for this month.

Lead

Some activity developed last week for January delivery at prices which have remained firm and which continue at 2.87½c., St. Louis, and 3c., New York. One producer reports heavy sales on Saturday, which is unusual for the day preceding a New Year's holiday. It is estimated that at least 50 per cent of the January needs still must be booked. Sentiment in this market is optimistic for the new year.

Zinc

December is characterized by one large producer of zinc as the dullest in his memory. Sales the past week have been very light, but the attitude of most smelters has been so firm that prices remain steady at 3.12½c., East St. Louis, and 3.47½c., New York. Reports of slight shading during the week are unconfirmed, but in any case the quantity possibly involved was inconsequential. Stocks are low and forward sales booked are the smallest in a long period. These facts are taken to indicate a better market in the first quarter.

Copper Averages

The average price of Lake copper for December, based on daily quotations in THE IRON AGE, was 5.06c., delivered New York. The average price of electrolytic copper for that month was 4.77c., refinery, or 5.02c., delivered Connecticut.

The Week's Prices. Cents Per Pound for Early Delivery

	Dec. 28	Dec. 29	Dec. 30	Dec. 31	Jan. 3
Electrolytic copper, N. Y.*	4.75	4.75	4.75	4.75	4.75
Lake copper, New York	5.00	5.00	5.00	5.00	5.00
Straits tin, spot, N. Y.	22.70	22.80	22.70	....	22.50
Zinc, East St. Louis	3.12½	3.12½	3.12½	3.12½	3.12½
Zinc, New York	3.49½	3.49½	3.49½	3.49½	3.49½
Lead, St. Louis	2.87½	2.87½	2.38½	2.87½	2.87½
Lead, New York	3.00	3.00	3.00	3.00	3.00

*Refinery quotation; price ¼c. higher delivered in Connecticut.
Aluminum, 98 to 99 per cent pure, 22.90c. a lb., delivered.
Nickel, electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 5.40c. a lb., New York.
Brass ingots, 85-5-5-5, 5.50c. a lb., New York and Philadelphia.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	24.50c. to 25.50c.
Tin, bar	26.50c. to 28.50c.
Copper, Lake	7.50c. to 8.50c.
Copper, electrolytic	7.25c. to 8.25c.
Copper, casting	7.00c. to 8.00c.
*Copper sheets, hot-rolled	13.62½c.
*High brass sheets	11.00c.
*Seamless brass tubes	13.25c.
*Seamless copper tubes	12.37½c.
*Brass rods	8.50c.
Zinc, slabs	4.37½c. to 4.87½c.
Zinc sheets (No. 9), casks	9.25c. to 9.50c.
Lead, American pig	3.75c. to 4.25c.
Lead, bar	5.25c. to 6.25c.
Lead, sheets	6.75c.
Antimony, Asiatic	8.00 to 9.00c.
Alum., virgin, 99 per cent plus	23.30c.
Alum. No. 1 for remelting, 98 to 99 per cent	16.00c.
Solder, ½ and ½	15.50c. to 16.50c.
Babbitt metal, commercial grade	21.00c. to 32.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse

Delivered Prices per Lb

Tin, Straits pig	27.00c.
Tin, bar	29.00c.
Copper, Lake	6.125c.
Copper, electrolytic	6.125c.
Copper, casting	5.875c.
Zinc, slab	4.25c. to 4.50c.
Lead, American pig	3.75c. to 4.00c.
Lead, bar	7.25c.
Antimony, Asiatic	8.50c.
Babbitt metal, medium grade	16.50c.
Babbitt metal, high grade	31.00c.
Solder, ½ and ½	16.75c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	3.75c.	4.25c.
Copper, hvy. and wire	3.50c.	4.125c.
Copper, light and bottoms	2.625c.	3.375c.
Brass, heavy	1.75c.	2.25c.
Brass, light	1.25c.	1.75c.
Hvy. machine composition	2.50c.	3.125c.
No. 1 yel. brass turnings	2.125c.	2.50c.
No. 1 red brass or compos. turnings	2.375c.	3.00c.
Lead, heavy	2.25c.	2.50c.
Zinc	1.25c.	1.625c.
Cast aluminum	3.75c.	5.25c.
Sheet aluminum	8.00c.	9.50c.

Railroad Equipment

Manufacturers Railway is in the market for one 1600-hp. oil-electric locomotive.

Missouri Pacific is interested in prices for converting seven dining cars into lounge cars.

Receivers of the Wabash have been authorized by the court to retire and dismantle 4350 units of obsolete rolling stock, including 3874 freight cars, 36 passenger coaches, 50 locomotives and 390 other units.

Pipe Lines

Metropolitan Water District of Southern California will take bids Jan. 12 on 40 miles of a 5 to 8-in. pipe line, which will be part of Colorado River Aqueduct.

Seattle, 1500 tons of electric welded steel pipe for Seventeenth Avenue North-East line. Thomas Scalzo, general contractor.

Youngstown Sheet & Tube Co. has engaged in the manufacture of railroad tie plates at its Indiana Harbor, Ind., plant. Sales will be handled by John M. Mulholland, special representative for railroad sales, with office at 111 West Washington Street, Chicago.

Prices of Finished and Semi-Finished Steel, Coke, Coal, Cast Iron Pipe

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
Del'd Philadelphia	1.91c.
Del'd New York	1.95c.
Del'd Detroit	1.80c.
F.o.b. Cleveland	1.65c.
F.o.b. Lackawanna	1.70c.
F.o.b. Birmingham	1.75c.
C.i.f. Pacific ports	2.10c.

Billet Steel Reinforcing
(as quoted by distributors)

F.o.b. P'gh mills, 40, 50, 60-ft.	1.50c.
F.o.b. Birmingham, mill lengths	1.75c.
F.o.b. Cleveland	1.50c.

Rail Steel

F.o.b. mills, east of Chicago dist.	1.35c. to 1.45c.
F.o.b. Chicago Heights mills	1.50c.

Iron

Common iron, f.o.b. Chicago	1.60c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	1.86c.
Common iron, del'd New York	1.90c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.75c.
Del'd Cleveland	1.8035c.
Del'd Philadelphia	1.7935c.
F.o.b. Coatesville	1.70c.
F.o.b. Sparrows Point	1.70c.
Del'd New York	1.898c.
C.i.f. Pacific ports	2.00c.
Wrought iron plates, f.o.b. P'gh	3.00c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.75c.
F.o.b. Lackawanna	1.70c.
F.o.b. Bethlehem	1.70c.
Del'd Cleveland	1.8035c.
Del'd Philadelphia	1.7495c.
Del'd New York	1.86775c.
C.i.f. Pacific ports (standard)	2.10c.
C.i.f. Pacific ports (wide flange)	2.20c.

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	1.90c.
F.o.b. Chicago mill	2.05c.
F.o.b. Buffalo	2.00c.

Alloy Steel Bars

(F.o.b. Pittsburgh, Chicago, Buffalo, Massillon or Canton.)

Alloy Quantity Bar Base, 2.45c. to 2.65c. per Lb.

S.A.E. Series Numbers	Alloy Differential per 100 Lbs.
2000 (1½% Nickel)	$0.25
2100 (1½% Nickel)	0.55
2300 (3½% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.16 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	0.20
6100 Chromium Vanadium Bar	1.20
6100 Chromium Vanadium Spring Steel	0.95
9250 Silicon Manganese Spring Steel (flats)	0.25
Rounds and Squares	0.50
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

Above prices are for hot-rolled steel bars, forging quality. The differential for cold-drawn bars is ⅝c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a section area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2½ in. thick, regardless of sectional area, take the bar price.

Cold Finished Bars *

Bars, f.o.b. Pittsburgh mill	1.70c.
Bars, f.o.b. Chicago	1.75c.
Bars, Cleveland	1.75c.
Bars, Buffalo	1.75c.
Bars, Detroit	1.90c.
Bars eastern Michigan	1.95c.
Shafting, ground, f.o.b. mill	
1½ in.	3.00c.
1-3/16 to 1¼ in.	2.50c.
1-9/16 to 1⅞ in.	2.35c.
1-15/16 to 2⅛ in.	2.20c.
2-15/16 to 6 in.	2.05c.

* In quantities of 10,000 to 19,999 lb.

SHEETS, STRIP, TIN PLATE, TERNE PLATE

Sheets

Hot-Rolled

No. 10, f.o.b. Pittsburgh	1.55c.
No. 10, f.o.b. Chicago mill	1.65c.
No. 10, del'd Philadelphia	1.86c.
No. 10, f.o.b. Birmingham	1.70c.
No. 10, c.i.f. Pacific Coast ports	2.17½c.

Hot-rolled and Annealed

No. 10, Pittsburgh	1.70c.
No. 10, Chicago mills	1.80c.
No. 10, Birmingham	1.85c.
No. 10, Pacific Coast ports	2.32½c.
No. 10, wrought iron, Pittsburgh	3.60c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.10c. to 2.20c.
No. 24, f.o.b. Ch'go mills	2.20c. to 2.30c.
No. 24, del'd Philadelphia	2.41c. to 2.51c.
No. 24, f.o.b. Birmingham	2.35c.
No. 24, c.i.f. Pacific Coast ports	2.85c.
No. 24, wrought iron, Pittsburgh	4.30c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	2.00c.
No. 10 gage, f.o.b. Chicago mills	2.10c.
No. 10 gage, del'd Philadelphia	2.41c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	2.50c.
No. 20 gage, f.o.b. Chicago mills	2.60c.
No. 20 gage, del'd Philadelphia	2.81c.

Note: Automobile body stock and steel furniture sheets to be quoted henceforth on cold-rolled sheet base prices, with extras for drawing quality.

Galvanized Sheets

No. 24, f.o.b. Pittsburgh	2.85c.
No. 24, f.o.b. Chicago mills	2.95c.
No. 24, del'd Philadelphia	3.16c.
No. 24, f.o.b. Birmingham	3.00c.
No. 24, c.i.f. Pacific Coast ports	3.50c.
No. 24, wrought iron, Pittsburgh	4.95c.

Long Ternes

No. 24, unassorted, 8-lb. coating, f.o.b. Pittsburgh	2.80c.

Vitreous Enameling Stock

No. 10, f.o.b. Pittsburgh	2.50c. to 2.60c.
No. 20, f.o.b. Pittsburgh	3.00c. to 3.10c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.30c.
No. 28, Chicago mill	2.40c. to 2.50c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. P'gh district mill	$4.25
Standard cokes, f.o.b. Gary	4.35

Terne Plate

(*F.o.b. Morgantown or Pittsburgh*)
(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$9.50
15-lb. coating I.C.	12.00
20-lb. coating I.C.	13.00
25-lb. coating I.C.	14.10
30-lb. coating I.C.	14.90
40-lb. coating I.C.	16.70

Hot-Rolled Hoops, Bands, Strips and Flats under ¼ in.

	Base per Lb.
All widths up to 24 in., Pittsburgh	1.45c.
All widths up to 24 in., Chicago	1.55c.
Cooperage stock, P'gh	1.55c. to 1.60c.
Cooperage stock, Chicago	1.65c. to 1.70c.

Cold-Rolled Strips

F.o.b. Pittsburgh	1.90c. to 2.00c.
F.o.b. Cleveland	1.90c. to 2.00c.
Del'd Chicago	2.20c. to 2.30c.
F.o.b. Worcester	2.20c.
Fender stock, No. 20, gage, Pittsburgh or Cleveland	2.65c. to 2.75c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)
(After Dec. 31, extras of 10c a 100 lb. on mixed and joint carloads, 25c on pool carloads and 40c. on less than carloads will be applied on all merchant wire products.)

To Manufacturing Trade

Bright wire	2.20c.
Spring wire	3.20c.

To Jobbing Trade

	Base per Keg
Standard wire nails	$1.95
Smooth coated nails	1.95
Galvanized nails	2.95

	Base per Lb.
Smooth annealed wire	2.35c.
Smooth galvanized wire	2.80c.
Polished staples	2.50c. to 2.65c.
Galvanized staples	2.75c. to 2.90c.
Barbed wire, galvanized	2.60c.
Woven wire fence No. 9 gage, per net ton	$55.00
Woven wire fence, No. 12½ gage and lighter, per net ton	60.00

Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill $2 a ton over Pittsburgh, and Birmingham mill $3 a ton over Pittsburgh.

STEEL AND WROUGHT PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Steel Inches	Steel Black	Steel Galv.	Wrought Iron Inches	Wrought Iron Black	Wrought Iron Galv.
⅛	51½	28½	⅛	+95	+14½
¼ to ⅜	57	34	¼ & ⅜	+5	+29½
½	62	49½	½	28	10½
¾	65½	55	¾	33	16½
1 to 3	67½	57	1 & 1¼	36	20½
			1½	40	23
			2	38	21

Lap Weld

2	61	50½	2	26	12½
2½ to 6	64½	54	2½ to 3½	33	18½
7 and 8	62	51	4 to 6	35	22
9 and 10	60	49	7 and 8	34	21½
11 and 12	59	48	9 to 12	31	16½

Butt Weld, extra strong, plain ends

⅛	48	33	⅛	+17	+49½
¼ to ⅜	53½	38½	¼ & ⅜	+7	+41
½	59	49½	½	28	12½
¾	63½	54	¾	33	17½
1 to 1½	65½	56	1 to 2	39	23
2 to 3	66½	57			

Lap Weld, extra strong, plain ends

2	59	49½	2	34	18½
2½ to 4	62½	53	2½ to 4	39	25
4½ to 6	62	52½	4½ to 6	38	24
7 to 8	58	47	7 & 8	36	22
9 and 10	51½	40½	9 to 12	26	13½
11 and 12	50½	39½			

Discounts on steel and wrought iron pipe are net and not subject to any points or preferentials.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel		Charcoal Iron	
2 in. and 2¼ in.	38	1½ in.	1
2½ in.—2¾ in.	46	1¾ in.	8
3 in.	52	2 in.—2¼ in.	13
3¼ in.—4½ in.	54	2½ in.—2¾ in.	16
4 in.	57	3 in.	17
4½ in. to 6 in.	46	3½ in. to 3½ in.	18
		4 in.	20
		4½ in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes
Cold-Drawn

1 in.	61	3 in.	46
1¼ to 1½ in.	53	3¼ to 3½ in.	48
1¾ in.	37	4 in.	51
2 to 2¼ in.	32	4½, 5 and 6 in.	40
2½ to 2¾ in.	40		

Hot Rolled

2 and 2¼ in.	38	3¼ to 3½ in.	54
2½ and 2¾ in.	46	4 in.	57
3 in.	52	4½, 5 and 6 in.	46

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. in lighter than standard gages take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30% base (carloads)	55
Carbon, 0.30% to 40% base	50

Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

RAILS AND TRACK SUPPLIES

Rails

	Per Gross Ton
Standard, f.o.b. mill	$40.00
Light (from billets), f.o.b. mill	30.00
Light (from rail steel, f.o.b. mill)	26.00

Track Equipment

	Base per 100 Lb.
Spikes, 9/16 in. and large	$2.40
Spikes, ½-in. and large	2.40
Spikes, boat and barge	2.60
Tie plates, steel	1.75
Angle bars	2.55
Track bolts, to steam railroads	3.50
Track bolts, to jobbers, all sizes, per 100 count	73 per cent off list

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine bolts	75
Carriage bolts	75
Lag bolts	75
Plow bolts, Nos. 1, 2, 3 and 7 heads	75
Hot-pressed nuts, blank or tapped, square	75
Hot-pressed nuts, blank or tapped, hexagons	75
C.p.c. and t. square or hex nuts, blank or tapped	75
Washers*	7.00c. to 8.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.

Bolts and Nuts

	Per Cent Off List
Semi-finished hexagon nuts	75
Semi-finished hexagon castellated nuts, S.A.E.	75
Stove bolts in packages, P'gh, 75, 25 and	10
Stove bolts in packages, Ch'go, 75, 25 and	10
Stove bolts in pkgs., Cleveland, 75, 25 and	10
Stove bolts in bulk, P'gh	80
Stove bolts in bulk, Chicago	80
Stove bolts in bulk, Cleveland	80
Tire bolts	60 and 10

Discount of 75 per cent off on bolts and nuts applies on carload business with jobbers and large consumers.

Large Rivets

(½-in. and larger)

	Base per Lb.
F.o.b. Pittsburgh or Cleveland	$2.25
F.o.b. Chicago	2.35

Small Rivets

(7/16-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70, 10 and 5
F.o.b. Cleveland	70, 10 and 5
F.o.b. Chicago	70, 10 and 5

Cap and Set Screws

Discounts to Jobbers

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)

	Per Cent off List
Milled cap screws, 1 in. dia. and smaller	80 and 25
Milled standard set screws, case hardened, 1 in. dia. and smaller	75 and 10
Milled headless set screws, cut thread, ⅝ in. and smaller	75 and 10
Upset hex. head cap screws, U.S.S.S. or S.A.E. thread, 1 in. dia. and smaller	80, 25 and 10
Upset set screws, sq. head, 1 in. dia. and smaller	75, 10 and 10
Upset set screws, 1⅛ in. and larger	75 and 10
Milled studs	70

SEMI-FINISHED STEEL

Billets and Blooms

	Per Gross Ton
Rerolling, 4-in. to 6-in., inclusive, Pittsburgh	$26.00
Rerolling, 4-in. to 6-in., inclusive, Youngstown	26.00
Rerolling, 4-in. to 6-in., inclusive, Cleveland	26.00
Rerolling, 4-in. to 6-in., inclusive, Chicago	26.00
Forging quality, Pittsburgh	31.00
Forging quality, Youngstown	31.00

Sheet Bars

(Open -Hearth or Bessemer)

	Per Gross Ton
Pittsburgh	$26.00
Youngstown	26.00
Cleveland	26.00

Slabs

(3 in. x 2 in. and under 10 in. x 10 in.)

	Per Gross Ton
Pittsburgh	$26.00
Youngstown	26.00
Cleveland	26.00

(*Turn to next page*)

Skelp

(F.o.b. Pittsburgh or Youngstown)

	Per Lb.
Grooved	1.60c.
Universal	1.60c.
Sheared	1.60c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	$37.00
Cleveland	37.00
Chicago	38.00

COKE, COAL AND FUEL OIL

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville Prompt	$1.75 to $2.00
Foundry, f.o.b. Connellsville prompt	2.50 to 4.25
Foundry, by-product, Chicago ovens, for delivery outside switching districts	7.00
Foundry, by-product, delivered in Chicago switching district	7.75
Foundry, by-product, New England, delivered	10.00
Foundry, by-product, Newark or Jersey City, del'd	8.20 to 8.81
Foundry, by-product, Phila.	9.00
Foundry, by-product, Cleveland, delivered	7.82
Foundry, Birmingham	5.00
Foundry, by-products, St. Louis, f.o.b., ovens	8.00
Foundry, by-products, del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.00 to $1.15
Mine run coking coal, f.o.b. W. Pa.	1.10 to 1.25
Gas coal, ¾-in., f.o.b. Pa. mines	1.25 to 1.40
Mine run gas coal, f.o.b. Pa. mines	1.20 to 1.30
Steam slack, f.o.b. W. Pa. mines	0.25 to 0.35
Gas slack, f.o.b. W. Pa. mines	0.35 to 0.45

Fuel Oil

Per Gal. f.o.b. Bayonne, N. J.	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
Per Gal. f.o.b. Baltimore	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
Per Gal. del'd Chicago	
No. 3 industrial fuel oil	2.80c. to 2.90c.
No. 5 industrial fuel oil	2.45c. to 2.50c.
Per Gal. f.o.b. Cleveland	
No. 3 distillate	5.25c.
No. 4 industrial	4.75c.

REFRACTORIES

Fire Clay Brick

	Per 1000 f.o.b. Works	
	High-heat Duty Brick	Intermediate Duty Brick
Penn.	$35.00	$25.00 to $30.00
Maryland	35.00	25.00 to 30.00
New Jer.	$44.00 to 57.00	
Ohio	35.00	25.00 to 30.00
Kentucky	35.00	25.00 to 30.00
Missouri	35.00	30.00
Illinois	35.00	25.00 to 30.00
Ground fire clay, per ton	6.50	

Chrome Brick

	Per Net Ton
Standard size	$42.50

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$39.00
Chicago	47.00
Birmingham	50.00
Silica clay, per ton	8.00

Magnesite Brick

	Per Net Ton
Standard sizes, burned, f.o.b. Baltimore and Chester, Pa.	$61.50
Unburned, f.o.b. Baltimore	52.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	38.50
Domestic, f.o.b. Chewelah, Wash.	20.90

CAST IRON PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$38.40 to $41.40
4-in., del'd Chicago	41.40 to 44.40
6-in., and larger, del'd New York	35.30
4-in., del'd New York	38.30
6-in., and larger, Birm'ham	35.30
4-in., Birmingham	38.30

Class "A" and gas pipe, $3 extra.

Pig Iron, Ores, Ferroalloys

VALLEY

Per Gross ton, f.o.b. Valley furnace:

Basic	$13.50
Bessemer	15.00
Gray Forge	14.50
No. 2 foundry	14.50
No. 3 foundry	14.00
Malleable	$14.50 to 15.00
Low phos., copper free	23.00 to 25.00

Freight rate to Pittsburgh or Cleveland district, $1.89.

PITTSBURGH

Per Gross ton, f.o.b. Pittsburgh district furnace:

Basic	$14.00
No. 2 foundry	15.00
No. 3 foundry	14.50
Malleable	15.00
Bessemer	15.00

Freight rates to points in Pittsburgh district range from 69c. to $1.26.

CHICAGO

Per gross ton at Chicago furnace:

N'th'n No. 2 fdy.	$15.50
N'th'n No. 1 fdy.	16.00
Malleable, not over 2.26 sil.	15.50
High phosphorus	15.50
Lake Super. charcoal, sil. 1.50, by rail	23.17
Southern No. 2 fdy.	16.14
Low phos., sil. 1 to 2, Copper free.	25.00
Silvery, sil. 8 per cent.	23.67
Bess. ferrosil'n, 15 per cent.	28.92

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnaces, not including a switching charge.

ST. LOUIS

Per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	$17.50
Malleable, f.o.b. Granite City	17.50
Northern No. 2 fdy., del'd St. Louis	$18.30 to 18.80
Southern No. 2 fdy. del'd	14.56
Northern malleable, del'd	18.30 to 18.80
Northern basic, del'd	18.30 to 18.80

Freight rates 83c. (average) Granite City to St. Louis; $2.30 from Chicago; $4.56 from Birmingham.

NEW YORK

Per gross ton, delivered New York district:

* Buffalo, No. 2, del'd east N. J.	$17.41 to $17.66
East Pa. No. 2 fdy.	14.02
East Pa. No. 2 fdy.	14.52

Freight rates: $1.52 to $2.63 from eastern Pennsylvania.

* Prices delivered to New Jersey cities having rate of $3.41 a ton from Buffalo.

BUFFALO

Per gross ton, f.o.b. furnace:

No. 2 fdy.	$16.00
No. 2X fdy.	16.50
No. 1 fdy.	17.50
Malleable, sil. up to 2.25	16.50
Basic	15.50
Lake Superior charcoal, del'd	23.41

NEW ENGLAND

Per gross ton delivered to most New England points:

*Buffalo, sil. 1.75 to 2.25	$19.05
*Buffalo, sil. 2.25 to 2.75	19.05
†Buffalo, sil. 1.75 to 2.25	17.41
†Buffalo, sil. 2.25 to 2.75	17.41
†Ala., sil. 1.75 to 2.25	15.64
†Ala., sil. 2.25 to 2.75	16.14

Freight rates: $5.05 all rail from Buffalo, and $3.41 to $3.91 rail and water from Buffalo when $1 barge and $2 to $2.50 New England freight rate are obtainable; $5.64 rail and water from Alabama to New England seaboard.

* All-rail rate.

† Rail-and-water rate.

CINCINNATI

Per gross ton, delivered Cincinnati:

Ala. fdy., sil. 1.75 to 2.25	$13.82
Ala. fdy., sil. 2.25 to 2.75	14.32
Tenn. fdy., sil. 1.75 to 2.25	13.82
N'th'n No. 2 foundry	$17.01 to 17.59
S'th'n Ohio silvery, 8%	21.02

Freight rates, $2.02 from Ironton and Jackson, Ohio; $3.82 from Birmingham.

CLEVELAND

Per gross ton at Cleveland furnace:

N'th'n No. 2 fdy. (local delivery)	$15.00
S'th'n fdy. sil. 1.75 to 2.25	16.14
Malleable (local delivery)	15.00
Ohio silvery, 8 per cent	21.87
Stand. low. phos., Valley	23.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 63c. average local switching charge; $3.12 from Jackson, Ohio; $6.14 from Birmingham.

PHILADELPHIA

Per gross ton at Philadelphia:

East. Pa. No. 2	$13.34 to $13.84
East. Pa. No. 2X	13.84 to 14.34
East. Pa. No. 1X	14.34 to 14.84
Basic (del'd east. Pa.)	13.50 to 14.00
Malleable	14.74 to 18.04
Stand. low phos. (f.o.b. east. Pa. furnace)	20.00 to 21.00
Cop. b'r'g low phos. (f.o.b. furnace)	20.00 to 21.00
Va. No. 2	21.79
Va. No. 2X	22.29

Prices, except as specified otherwise, are del'd Philadelphia. Freight rates: 84c. to $1.79 from eastern Pennsylvania furnaces; $4.67 from Virginia furnaces.

BIRMINGHAM

Per gross ton, f.o.b. Birmingham dist. furnace:

No. 2 fdy., 1.75 to 2.25 sil.	$11.00
No. 2 soft, 2.25 to 2.75 sil.	11.50
Basic	11.00

CANADA

Per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	$22.60
No. 2 fdy., sil. 1.75 to 2.25	22.10
Malleable	22.60
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	$24.00
No. 2 fdy., sil. 1.75 to 2.25	23.50
Malleable	24.00
Basic	$23.00 to 23.50

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard	$68.00
Foreign, 80%, Atlantic or Gulf port, duty paid	68.00

Prices for lots of one carload or more; extras applied on less than carload lots.

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$24.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50% (carloads)	$74.50
50% (less carloads)	82.00
75% (carloads)	120.00
75% (less carloads)	130.00
14% to 16% (f.o.b.) Welland, Ont., in carloads	31.00
14% to 16% (less carloads)	36.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		Per Gross Ton	
10%	$20.50	14%	$23.50
11%	21.00	15%	24.00
12%	21.50	16%	25.00
13%	22.50	17%	26.50

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		Per Gross Ton	
6%	$18.00	12%	$20.50
7%	18.50	13%	21.50
8%	18.75	14%	22.50
9%	19.00	15%	23.00
10%	19.50	16%	24.00
11%	20.00	17%	25.50

Other Ferroalloys

Ferrotungsten, per lb. wo. del., carloads	94c.
Ferrotungsten, less carloads	$1.00
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	9.50c.
Ferrochromium, 2% carbon	16.50c. to 17.00c.
Ferrochromium, 1% carbon	17.50c. to 18.00c.
Ferrochromium, 0.10% carbon	19.50c. to 20.00c.
Ferrochromium, 0.06% carbon	20.00c. to 20.50c.
Ferrovanadium, del., per lb. contained Va.	$2.60 to $2.80
Ferrocarbontitanium, 15 to 18%, per net ton, f.o.b. furnace in carloads	160.00
Ferrophosphorus, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn., base per gross ton with $2 unitage	50.00
Ferrophosphorus, electric, 24% f.o.b. Anniston, Ala., per gross ton with $2.75 unitage	65.00
Ferromolybdenum, per lb. Mo., del.	95c.
Calcium molybdate, per lb. Mo., del.	80c.
Silico spiegel, per ton, f.o.b. furnace, car lots	$36.00
Ton lots or less, per ton	41.00
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	85.00
2% carbon grade	90.00
1% carbon grade	100.00
Spot prices	$5 a ton higher

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.50% iron	$4.80
Old range, non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algerian	8c. to 8.50c.
Iron, low phos., Swedish, average 68½% iron	9c.
Iron, basic or foundry, Swedish, average 65% iron	8c.
Iron, basic or foundry, Russian, aver. 63% iron (nom.)	9c.
Manganese, Caucasian, washed 53%	*23c.
Manganese, African, Indian, 50-52%	*21c. to 22c.
Manganese, Brazilian, 46 to 48%	*13c.

	Per Net Ton Unit
Tungsten, Chinese wolframite, duty paid	$10.00

	Per Gross Ton
Tungsten, domestic scheelite	$8.00 to $10.40
Chrome, 45%, Cr_2O_3, crude, c.i.f. Atlantic seaboard	16.00
Chrome, 48%, Cr_2O_3, c.i.f. Atlantic seaboard	18.00

* Quotations nominal in absence of sales.

Fluorspar

	Per Net Ton
Domestic, washed gravel 85-5, f.o.b. Kentucky and Illinois mines	$9.00 to $10.00
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	12.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	$16.00 to 16.75
Domestic, No. 1 ground bulk, 85 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	30.00

Iron and Steel Scrap

PITTSBURGH

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$8.00 to $8.50
No. 2 heavy melting steel	7.00 to 7.50
No. 2 railroad wrought	8.00 to 8.50
Scrap rails	8.00 to 8.50
Rails 3 ft. and under	10.00 to 10.50
Sheet bar crops, ordinary	9.00 to 9.50
Compressed sheet steel	8.00 to 8.50
Hand bundled sheet steel	7.00 to 7.50
Hvy. steel axle turnings	7.00 to 7.50
Machine shop turnings	6.25 to 6.75
Short shov. steel turnings	6.25 to 6.75
Short mixed borings and turnings	5.50 to 6.00
Cast iron borings	5.50 to 6.00
Cast iron carwheels	8.00 to 8.50
Heavy breakable cast	8.00 to 8.50
No. 1 cast	9.00 to 10.00
Railr. knuckles and couplers	9.50 to 10.00
Rail. coil and leaf springs	9.50 to 10.00
Rolled steel wheels	9.50 to 10.00
Low phos. billet crops	11.00 to 11.50
Low phos. sheet bar crops	11.00 to 11.50
Low phos. plate scrap	10.00 to 10.50
Low phos. punchings	10.50 to 11.00
Steel car axles	11.00 to 11.50

CHICAGO

Delivered Chicago district consumers:

	Per Gross Ton
Heavy melting steel	$5.00 to $5.50
Shoveling steel	5.00 to 5.50
Frogs, switches and guards	$5.00 to $5.50
Hydraulic comp. sheets	3.75 to 4.25
Drop forge flashings	4.00 to 4.50
No. 1 busheling	3.50 to 4.00
Rolled carwheels	7.00 to 7.50
Railroad tires	8.00 to 8.50
Railroad leaf springs	8.00 to 8.50
Axle turnings	4.50 to 5.00
Steel couplers and knuckles	7.00 to 7.50
Coil springs	8.50 to 9.00
Axle turnings (elec. fur.)	5.50 to 6.00
Low phos. punchings	8.00 to 8.50
Low phos. plates, 12 in. and under	8.00 to 8.50
Cast iron borings	3.00 to 3.50
Short shoveling turnings	3.00 to 3.50
Machine shop turnings	3.00 to 3.50
Rerolling rails	7.50 to 8.00
Steel rails, less than 3 ft.	8.25 to 8.75
Steel rails, less than 2 ft.	8.75 to 9.25
Angle bars, steel	7.00 to 7.50
Cast iron carwheels	7.00 to 7.50
Railroad malleable	5.50 to 6.00
Agricultural malleable	5.00 to 5.50
* Relaying rails, 56 to 60 lb.	15.00 to 17.00
* Relay rails, 65 lb. and up	18.00 to 23.00

Per Net Ton

Iron angle and splice bars	$5.00 to $5.50
Iron arch bars, transoms	5.00 to 5.50
Iron car axles	11.00 to 11.50
Steel car axles	8.50 to 9.00
No. 1 railroad wrought	4.00 to 4.50
No. 2 railroad wrought	4.50 to 5.00
No. 1 busheling	2.50 to 3.00

No. 2 busheling	$2.00 to	$2.50
Locomotive tires, smooth	7.50 to	8.50
Pipe and flues	1.25 to	1.75
No. 1 machinery cast	6.25 to	6.75
Clean automobile cast	6.75 to	7.25
No. 1 railroad cast	5.25 to	5.75
No. 1 agricultural cast	5.75 to	6.25
Stove plate	5.50 to	6.00
Grate bars	5.00 to	5.50
Brake shoes	5.75 to	6.25

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

PHILADELPHIA

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$6.50 to	$7.00
No. 2 heavy melting steel	5.00 to	5.50
No. 1 railroad wrought	7.50 to	8.00
Bundled sheets	4.00 to	4.50
Hydraulic compressed, new	5.50 to	6.00
Hydraulic compressed, old	4.00 to	4.50
Machine shop turnings	3.50 to	4.00
Heavy axle turnings	5.50 to	6.00
Cast borings	3.50 to	3.75
Heavy breakable cast	...	8.50
Stove plate (steel works)	6.00 to	6.50
No. 1 low phos. heavy	10.00 to	10.50
Couplers and knuckles	8.00 to	8.50
Rolled steel wheels	8.00 to	8.50
No. 1 blast furnace	3.50 to	3.75
Spec. iron and steel pipe	6.50 to	7.00
Shafting	12.00 to	13.00
Steel axles	12.00 to	13.00
No. 1 forge fire	5.50 to	6.00
Cast iron carwheels	8.00 to	8.50
No. 1 cast	8.00 to	9.00
Cast borings (chem.)	8.00 to	10.00
Steel rails for rolling	9.00 to	9.50

CLEVELAND

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$7.00 to	$7.25
No. 2 heavy melting steel	6.25 to	6.50
Compressed sheet steel	6.00 to	6.50
Light bundled sheet stampings	4.00 to	4.50
Drop forge flashings	5.25 to	5.75
Machine shop turnings	3.25 to	3.50
Short shoveling turnings	4.00 to	4.50
No. 1 busheling	5.25 to	5.50
Steel axle turnings	5.00 to	5.50
Low phos., billet crops	10.00 to	11.00
Cast Iron borings	3.75 to	4.00
Mixed borings and short turnings	3.75 to	4.00
No. 2 busheling	3.75 to	4.00
No. 1 cast	7.50 to	8.00
Railroad grate bars	5.00 to	5.50
Stove plate	5.00 to	5.50
Rails under 3 ft.	8.50 to	9.00
Rails for rolling	8.50 to	9.00
Railroad malleable	6.75 to	7.00
Cast iron carwheels		8.00

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:

No. 1 heavy melting steel	$6.50 to	$7.00
No. 2 heavy melting scrap	6.00 to	6.50
Scrap rails	6.00 to	6.50
New hydraul. comp. sheets	6.00 to	6.50
Old hydraul. comp. sheets		5.00
Drop forge flashings	6.00 to	6.50
No. 1 busheling	6.00 to	6.50
Hvy. steel axle turnings		6.00
Machine shop turnings	4.00 to	4.50
Knuckles and couplers		10.00
Coil and leaf springs		10.00
Rolled steel wheels		10.00
Low phos. billet crops	9.00 to	9.50
Short shov. steel turnings	5.50 to	6.00
Short mixed borings and turnings	3.75 to	4.25
Cast iron borings	3.75 to	4.25
No. 2 busheling	3.50 to	4.00
Steel car axles	10.00 to	11.00
Iron axles	10.00 to	11.00
No. 1 machinery cast	9.50 to	10.00
No. 1 cupola cast	8.50 to	9.00
Stove plate	6.50 to	7.00
Steel rails, 3 ft. and under	9.25 to	9.75
Cast iron carwheels	8.00 to	9.00
Industrial malleable	7.00 to	7.50
Railroad malleable	7.00 to	7.50
Chemical borings	7.50 to	8.00

BIRMINGHAM

Per gross ton delivered consumers' yards:

Heavy melting steel	$7.50 to	$8.00
Scrap steel rails	8.00 to	8.50
Short shoveling turnings		4.00
Stove plate		6.00
Steel axles		9.00
Iron axles		9.00
No. 1 railroad wrought	4.50 to	5.00
Rails for rolling	8.00 to	8.50
No. 1 cast		8.50
Tramcar wheels		8.50
Cast iron borings, chem		8.50

ST. LOUIS

Per gross ton delivered consumers' yards:

Selected heavy steel	$5.50 to	$6.00
No. 1 heavy melting	5.00 to	5.50
No. 2 heavy melting	4.75 to	5.25
No. 1 locomotive tires	5.00 to	5.50
Misc. stand-sec. rails	5.25 to	5.75
Railroad springs	6.00 to	6.50
Bundled sheets	2.00 to	2.50
No. 2 railroad wrought	5.00 to	5.50
No. 1 busheling	3.50 to	4.00
Cast iron borings and shoveling turnings	2.75 to	3.25
Iron rails	7.00 to	7.50
Rails for rolling	6.75 to	7.25
Machine shop turnings	2.00 to	2.50
Heavy turnings	3.00 to	3.50
Steel car axles	8.50 to	9.00
Iron car axles	11.00 to	11.50
Wrot. iron bars and trans.	4.00 to	4.50
No. 1 railroad wrought	3.50 to	4.00
Steel rails less than 3 ft.	7.00 to	7.50
Steel angle bars	6.00 to	6.50
Cast iron carwheels	$5.00 to	$5.50
No. 1 machinery cast	6.50 to	7.00
Railroad malleable	4.00 to	4.50
No. 1 railroad cast	6.25 to	6.75
Stove plate	6.00 to	6.50
Relay, rails, 60 lb. and under	16.00 to	16.50
Relay, rails, 60 lb. and over	20.00 to	21.00
Agricult. malleable	4.00 to	4.50

NEW YORK

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$3.50 to	$4.50
No. 2 heavy melting steel		3.00
Heavy melting steel (yard)		1.50
No. 1 hvy. breakable cast	5.00 to	5.25
Stove plate (steel works)	2.50 to	2.90
Machine shop turnings	0.75 to	1.25
Short shoveling turnings	0.75 to	1.25
Cast borings	0.50 to	1.00
No. 1 blast furnace	0.50 to	1.00
Steel car axles	8.00 to	8.50
Spec. iron and steel pipe	2.50 to	2.75
Forge fire	2.75 to	3.00
No. 1 railroad wrought	4.00 to	4.50
No. 1 yard wrought long	3.25 to	3.50
Rails for rolling	5.00 to	5.50
No. 1 cast		4.50
No. 2 cast		4.50
Stove plate (foundry)		4.50
Malleable cast (railroad)	4.00 to	4.50
Cast borings (chemical)	6.00 to	6.50

Per gross ton, delivered local foundries:

No. 1 machinery cast		$9.00
No. 1 hvy. cast (cupola size)	7.50 to	8.00
No. 2 cast	4.00 to	4.50

BOSTON

Dealer's buying prices per gross ton:

No. 1 heavy melting steel	$3.00 to	$3.25
Scrap T rails	2.50 to	2.75
Machine shop turnings	0.80 to	1.00
Cast iron borings		1.95
Bundled skeleton, long	2.00 to	2.10
Forge flashings	3.00 to	3.50
Blast furnace scrap	0.90 to	1.00
Forge scrap	3.00 to	3.25
Shafting	9.50 to	10.00
Steel car axles	9.00 to	9.50
Wrought pipe	4.00 to	4.25
Rails for rolling	4.50 to	5.00
Cast iron borings, chemical	7.00 to	7.25

Per gross ton delivered consumers' yards:

Textile cast	$7.00 to	$7.50
No. 1 machinery cast	7.50 to	8.00
Stove plate	5.00 to	5.25
Railroad malleable	8.00 to	8.50

CINCINNATI

Dealers' buying prices per gross ton:

Heavy melting steel	$5.00 to	$5.50
Scrap rails for melting	6.00 to	6.50
Loose sheet clippings	1.50 to	2.00
Bundled sheets	3.75 to	4.25
Cast iron borings	3.25 to	3.75
Machine shop turnings	3.00 to	3.50
No. 1 busheling	4.50 to	5.00
No 2 busheling	2.75 to	3.25
Rails for rolling	6.50 to	7.00
No. 1 locomotive tires	7.50 to	8.00
Short rails	9.00 to	9.50
Cast iron carwheels	6.50 to	7.00
No. 1 machinery cast	8.25 to	8.75
No. 1 railroad cast	7.75 to	8.25
Burnt cast	$4.25 to	$4.75
Stove plate	4.25 to	4.75
Agricultural malleable	6.75 to	7.25
Railroad malleable	7.00 to	7.50

DETROIT

Dealers' buying prices per gross ton:

Hvy. melting steel	$4.50 to	$5.00
Borings and short turnings	2.00 to	2.50
Long turnings	1.50 to	2.00
No. 1 machinery cast	7.75 to	8.25
Automotive cast	8.00 to	8.50
Hydraul. comp. sheets	4.00 to	4.50
Stove plate	3.00 to	3.50
New No 1 busheling	3.50 to	4.00
Old No. 2 busheling	1.50 to	2.00
Sheet clippings	1.25 to	1.75
Flashings	2.75 to	3.25

CANADA

Dealers' buying prices per gross ton:

	Toronto	Montreal
Heavy melting steel	$7.00	$6.00
Rails, scrap	7.00	6.00
No. 1 wrought	6.00	8.00
Machine shop turnings	2.00	2.00
Boiler plate	5.00	4.50
Heavy axle turnings	2.50	2.50
Cast borings	2.00	2.00
Steel borings	2.00	2.00
Wrought pipe	2.00	2.00
Steel axles	7.00	9.00
Axles, wrought iron	7.00	11.00
No. 1 machinery cast	12.50	10.00
Stove plate	10.00	8.00
Standard carwheels	10.00	8.50
Malleable	10.00	8.00

Warehouse Prices for Steel Products

PITTSBURGH

Base per Lb.	
Plates	2.85c.
Structural shapes	2.85c.
Soft steel bars and small shapes	2.60c.
Reinforcing steel bars	2.60c.
Cold-finished and screw stock—	
Rounds and hexagons	2.95c.
Squares and flats	3.45c.
Hoops and bands, under ¼ in.	2.95c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.15c.
Galv. sheets (No. 24), 25 or more bundles	3.65c.
Hot-rolled sheets (No. 10)	3.10c.
Galv. corrug. sheets (No. 28), per square (less than 3750 lb.)	$3.74
Spikes, large	2.40c.
Small	2.65c. to 2.80c.
Boat	2.90c.
Track bolts, all sizes, per 100 count, 70 per cent off list.	
Machine bolts, 100 count, 70 per cent off list.	
Carriage bolts, 100 count, 70 per cent off list.	
Nuts, all styles, 100 count, 70 per cent off list.	
Large rivets, base per 100 lb	$3.00
Wire, black, soft ann'l'd, base per 100 lb.	2.75
Wire, galv. soft, base per 100 lb	3.20
Common wire nails, per keg	2.35
Cement coated nails, per keg	2.35

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 999 lb.

CHICAGO

Base per Lb.	
Plates and structural shapes	3.00c.
Soft steel bars	2.75c.
Reinforc. bars, billet steel	1.35c to 1.40c.
Rail steel reinforment	1.15c. to 1.25c.
Cold-fin. steel bars and shafting Rounds and hexagons	3.00c.
Flats and squared	3.50c.
Bands, 3/16 in. (in Nos. 10 and 12 gages)	2.95c.
Hoops (No. 14 gage and lighter)	3.50c.
Hot-rolled annealed sheets (No. 24)	3.45c.
Galv. sheets (No. 24)	3.75c.
Hot-rolled sheets (No. 10)	2.75c.
Spikes (3/16 in. and lighter)	3.45c.
Track bolts	4.50c.
Rivets, structural	3.75c.
Rivets, boiler	3.75c.

Per Cent Off List	
Machine bolts	65
Carriage bolts	65
Coach and lag screws	65
Hot-pressed nuts, sq., tap. or blank	65
Hot-pressed nuts, hex., tap. or blank	65
Hex. head cap screws	80 and 10
Cup point set screws	75 and 10
Flat head bright wood screws	52½ and 10
Spring cotters	60
Stove bolts	80
Rd. hd. tank rivets, 7/16 in. and smaller	65
Wrought washers	$4.50 off list
No. 8 black ann'l'd wire, per 100 lb.	$3.45
Com. wire nails, base per keg	2.30
Cement c't'd nails, base per keg	2.30

NEW YORK

Base per Lb.	
Plates and struc. shapes	3.10c.
Soft steel bars, small shapes	3.10c.
Iron bars	3.24c.
Iron bars, Swed. charcoal	6.00c. to 6.50c
Cold-fin. shafting and screw stock: Rounds and hexagons	3.39c.
Flats and squares	3.89c.
Cold-roll. strip, soft and quarter hard	4.95c.
Hoops	3.30c.
Bands	3.30c.
Hot-rolled sheets (No. 10)	3.00c.
Hot-rolled ann'l'd sheets (No. 24*)	3.50c.
Galvanized sheets (No. 24*)	4.00c.
Long terne sheets (No. 24)	4.50c.
Standard tool steel	12.00c.
Wire, black annealed (No. 10)	3.60c.
Wire, galv. annealed (No. 10)	4.05c.
Tire steel ⅛ x ⅛ in. and larger. Smooth finish, 1 to 2½ x ¼ in. and larger	3.40c. 3.75c.
Open-hearth spring steel, bases	4.50c. to 7.00c.
Common wire nails, base, per keg	$2.60

Per Cent Off List	
Machine bolts, cut thread: ¾ x 6 in. and smaler	.65 to 65 and 10
1 x 30 in. and smaller	.65 to 65 and 10
Carriage bolts, cut thread: ½ x 6 in. and smaller	.65 to 65 and 10
¾ x 20 in. and smaller	.65 to 65 and 10

Per 100 Ft.	
Boiler Tubes: Lap welded, 2-in.	$18.95
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in.	24.94
Charcoal iron, 4-in.	63.65

* No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ST. LOUIS

Base per Lb.	
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.00c.
Cold-fin. rounds, shafting, screw stock	3.36c.
Hot-rolled annealed sheets (No. 24)	3.70c.
Galv. sheets (No. 24)	4.00c.
Hot-rolled sheets (No. 10) up to and inc. 48 in. wide	3.00c.
over 48 in. wide	3.15c.
Black corrug. sheets (No. 24)	3.75c.
Gal. corrug. sheets	4.05c.
Structural rivets	4.00c.
Boiler rivets	4.00c.

Per Cent Off List	
Tank rivets, 7/16 in. and smaller, 100 lb. or more	65
Less than 100 lb.	60
Machine bolts	70
Carriage bolts	70
Lag screws	70
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more	70
Less than 200 lb.	60
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	70
Less than 200 lb.	60

PHILADELPHIA

Base per Lb.	
*Plates, ¼-in. and heavier	2.45c.
*Structural shapes	2.45c.
*Soft steel bars, small shapes, iron bars (except bands)	2.45c.
Reinforc. steel bars, sq., twisted and deform.	2.25c.
Cold-fin. steel, rounds and hex.	3.35c.
Cold-fin. steel, sq. and flats	3.85c.
*Steel hoops	3.00c.
*Steel bands, No. 12 to 3/16 in., incl.	2.75c.
Spring steel	5.00c.
Hot-rolled annealed sheets (No. 24)	3.55c.
Galvanized sheets (No. 24)	3.75c.
*Hot-rolled annealed sheets (No. 10)	2.90c.
Diam. pat. floor plates, ¼ in.	5.00c.
Swedish iron bars	5.60c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

*Base prices subject to deductions on orders aggregating 4000 lb. or over.

CLEVELAND

Base per Lb.	
Plates and struc. shapes	2.95c.
Soft steel bars	2.75c.
Reinforc. steel bars	1.75c. to 1.95c.
Cold-fin. rounds and hex.	2.95c.
Cold-fin. flats and sq.	3.45c.
Flat rolled steel under ⅛ in.	3.00c.
Cold-finished strip	5.55c.
Hot-rolled annealed sheets (No 24)	3.25c.
Galvanized sheets (No. 24)	3.75c.
Hot-rolled sheets (No. 10)	3.00c.
Black ann'l'd wire, per 100 lb	$2.75
No. 9 galv. wire, per 100 lb	3.20
Com. wire nails, base per keg	2.35

*Net base, including boxing and cutting to length:

CINCINNATI

Base per Lb.	
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.00c.
New billet reinforc. bars	3.00c.
Rails steel reinforc. bars	3.00c.
Hoops	3.90c.
Bands	3.20c.
Cold-fin. rounds and hex.	3.32c.
Squares and flats	3.82c.
Hot-rolled annealed sheets (No. 24)	3.75c.
Galv. sheets (No. 24)	4.25c.
Hot-rolled sheets (No. 10)	3.30c.
Structural rivets	4.20c.
Small rivets	60 per cent off list
No. 9 ann'l'd wire, per 100 lb	$3.00
Com. wire nails, base per keg (10 to 40 kegs)	2.65
Larger quantities	2.50
Cement c't'd nails, base 100-lb. keg	2.95
Chain, per 100 lb	10.25

Net per 100 Ft.	
Seamless steel boiler tubes, 2-in.	$15.87
4-in.	34.57
Lap-welded steel boiler tubes, 2-in.	15.12
4-in.	32.96

BUFFALO

Base per Lb.	
Plates and struc. shapes	3.20c.
Soft steel bars	2.95c.
Reinforcing bars	2.95c.
Cold-fin. flats and sq.	3.50c.
Rounds and hex.	3.00c.
Cold-rolled strip steel	5.25c.
Hot-rolled annealed sheets (No. 24)	3.70c.
Galv. sheets (No. 24)	4.05c.
Bands	3.30c.
Hoops	3.95c.
Hot-rolled sheets (No. 10)	3.45c.
Com. wire nails, base per keg	$2.60
Black wire, base per 100 lb.	3.25

BOSTON

Per Lb.	
*Beams, channels, angles, tees, zees	3.00c.
*H beams and shapes	3.00c.
*Plates—sheared, tank, and univ. mill, ¼ in. thick and heavier	3.00c.
Floor plates, diamond pattern	5.25c.
*Bar and bar shapes (mild steel)	2.90c.
*Bands 3/16 in. thick and No. 12 ga. incl.	3.40c.
Hoops, No. 14 ga. and lighter	4.90c. to 5.40c.
*Half rounds, hf. ovals, ovals and bevels	4.15c.
Tire steel, rd. edge 1½ x ⅛ in. and larger	4.50c.
Smaller sizes	4.75c.
Cold-finished rounds and hexagons	3.60c.
Cold-rolled strip steel	5.20c.
Cold-finished squares and flats	4.10c.
*Blue annealed sheets No. 10 ga.	3.15c.
One pass cold-rolled sheets No. 24 ga.	3.50c.
Blued stove pipe sheets No. 24 ga.	3.90c.
Galvanized steel sheets No 24 ga.	4.00c.
Lead coated (long ternes) No. 24 ga.	5.00c.

*Base prices for 15,000 lb. orders, extras apply for smaller quantities.

PACIFIC COAST

	Base per Lb. San Francisco	Los Angeles	Seattle
Plates and struc. shapes, ¼-in. and heavier	3.15c.	3.30c.	3.00c.
Soft steel bars	3.15c.	3.30c.	3.00c.
Reinforcing bars	3.00c.	3.00c.	3.00c.
Hot-rolled annealed sheets No. 24)	3.90c.	4.20c.	4.50c.
Hot-rolled sheets (No. 10)	3.75c.	3.50c.	4.00c.
Galv. sheets (No. 24)	4.55c.	4.50c.	5.00c.
*Struc. rivets, ½ in. and larger, less than 1000 lb.	5.75c.	5.00c.	4.00c.
*Cold-finished steel Rounds	5.50c.	5.50c.	4.50c.
Squares and hexagons	6.75c.	6.75c.	5.75c.
Flats	7.25c.	7.25c.	6.75c.
Nails—base per keg less carload:			
Com. 4-60d	$2.40	$2.40	$2.40
S. Box 4-20d	2.40	2.40	2.40
Finish 6 & 8d	2.40	2.40	2.40
All others	2.65	2.65	2.65

*Subject to deductions for quantity.

... PERSONALS ...

FRANK F. MARQUARD has been appointed general superintendent in charge of operation at the Clairton, Pa., steel works and by-product coke plant of the Carnegie Steel Co., Pittsburgh. He succeeds HENRY J. DAVIS, who retired on Jan. 1, and is in turn succeeded as assistant general superintendent by ROBERT J. TULLY.

Mr. Marquard was born at Cleveland in 1875 and attended grade and high school in Dayton, Ohio. He was graduated from the Miami Military Academy in 1892, and received a civil engineering degree from the Ohio State University in 1896. He later took up mining engineering at the Case School of Applied Science, from which he was graduated in 1898. In that year he went to work as chief chemist with the American Steel Casting Co., Sharon, Pa., and subsequently served as chemist for the National Steel Co., Sharon, as superintendent of the Buhl By-Product Coke plant, and as chief chemist and metallurgist for the Sharon Steel Co., Farrell, Pa. From 1904 to 1915 he was superintendent of the by-products coke plant of the Carnegie company at Farrell, having been active in its construction. He was made superintendent of the Carnegie company's by-product coke plant at Clairton in 1915, and served in that capacity until 1926, when he was made assistant general superintendent of the steel works and blast furnaces, as well as of the coke plant at Clairton. Mr. Marquard has been responsible for numerous important technical discoveries in the making of coke, by-products, pig iron and steel. In 1902 he developed the use of ferrophosphorus as a rephosphorizing agent for basic open-hearth steel to be used in sheet bar manufacture. In 1903 he was responsible for the drum-type process for galvanizing nails. In 1908 he discovered a phenol disposal method for ammonia still waste, now used in practically all coke plants, and in the same year he first put into manufacture the use of metallurgical coke from 100 per cent Pittsburgh high-volatile coals. In 1914 he superintended the construction of the first benzol plant of the United States Steel Corpn. for producing pure toluol. He has taken out numerous patents on improved processes in by-product coke manufacture, and is the author of numerous papers on the effect of coals in the production of high-quality metallurgical coke.

Mr. Tully entered the steel industry as a machinist apprentice for the New Castle Wire Nail Co., New Castle, Pa., which was later absorbed by the Carnegie Steel Co. He was also engaged in the construction of the Farrell plant of the Carnegie company, and was later identified with the New Castle works of the American Sheet & Tin Plate Co. He returned to the Carnegie organization as master mechanic at the New Castle steel works, and later became general superintendent of that plant.

❖ ❖ ❖

ALAN WOOD SMITH, who has charge of roll sales for the Aetna-Standard Engineering Co., Youngstown, Ohio, has been given complete charge of both sales and manufacture of rolls.

❖ ❖ ❖

DAVID B. CARSON, formerly vice-president of the Associated Alloy Steel Co., has been appointed manager of the stainless steel department of the Sharon Steel Hoop Co., Sharon, Pa. Prior to his connection with the Associated Alloy company, Mr. Carson was sales manager in the development division of the Central Alloy Steel Corpn. With the exception of two years in the Army during the war, he has been identified with the alloy steel industry since his graduation from Ohio State University in 1913.

❖ ❖ ❖

JOHN S. KEEFE, who retired as president of the American Steel & Wire Co., Jan. 1, after 44 years of service in the iron and steel industry, was honored with an informal dinner at the Union Club, Cleveland, Dec. 29. The guests, numbering 30 to 40, included C. F. BLACKMER, the new president; J. LESTER PERRY, who has succeeded Mr. Blackmer as vice-president, and other executives and department heads of the company's various plants.

❖ ❖ ❖

M. P. CONWAY, formerly district sales manager at Milwaukee for the Concrete Steel Co., has been appointed district sales manager at Chicago, succeeding G. O. WITH, whose resignation became effective Dec. 1.

... OBITUARY ...

FRANK L. KOHLHASE, president of the National Stamping & Electrical Works, Chicago, died Dec. 27 at his winter home at St. Petersburg, Fla. Mr. Kohlhase was born in Stettin, Germany, 71 years ago and went to Chicago in 1876. He established the present business in 1897.

❖ ❖ ❖

PHILLIP A. SCHWAB, president, Schwab Boiler & Machine Co., Milwaukee, died Dec. 27, aged 70 years. He was a native of Wisconsin. In 1896 he founded the Centennial Machine & Iron Works in Milwaukee, which he conducted until the Schwab Boiler & Machine Co. was founded.

❖ ❖ ❖

THOMAS CUNNINGHAM, formerly general manager and principal owner of the Cunningham Iron Works, Boston, died at Tampa, Fla., on Dec. 25, aged 79 years. Mr. Cunningham retired from business several years ago, and since then had traveled extensively.

Census Bureau Reports 1931 Production Figures

WASHINGTON, Jan. 3.—Iron and steel production in 1931 was valued at $3,273,769,505 against $7,137,928,058 in 1929, according to the Bureau of the Census. Reports for the former year were received from 5887 establishments as against 6640 in 1929. The bureau statement covers a summary of all industries and the gross value of products includes data for partly manufactured commodities or producers' goods.

Wage earners in the iron and steel classification fell to 598,308 in 1931 from 880,882 in 1929 and wages declined to $703,123,848 from $1,380,986,821.

The cost of materials, containers for products, fuel and purchased electric energy decreased to $1,802,953,134 from $3,862,873,486. The value added by manufacture declined to $1,470,816,371 from $3,275,054,572.

The value of machinery production in 1931 was $3,371,852,839 as against $7,043,380,390. Machine tool production in 1931 was valued at $80,954,449.

Railroad Traffic Sunk to Low Levels in 1932

Preliminary reports, from the railways, which will not become complete for several weeks, indicate that loadings of revenue freight in 1932 will not exceed 28,100,000 cars, states R. H. Aishton, president, American Railway Association. This total is the lowest for any year since the tabulation of these reports began in 1918, and a reduction of 9,053,100 cars or 24.4 per cent under the total for 1931.

Measured in net ton miles, the volume of freight handled in 1932 will be, complete reports are expected to show, 257,000,000,000 net ton miles, which was lower than for any year since 1909, and a reduction of 24.4 per cent under 1931.

Passenger traffic in 1932 was less than for any year since 1900, amounting to 16,775,000,000 passenger miles. This was a reduction of 64.2 per cent under the record year of 1920.

Bids will be opened on Feb. 2 by the Treasury Department for new vaults it is to install. An appropriation of $1,226,000 has been made for purchase of the vaults.

Statistical Record of Iron and Steel

Monthly Average Prices Computed from the Weekly Market Quotations of THE IRON AGE in the Period of 1916 to 1932

Composite Pig Iron Price

Average of THE IRON AGE quotations on basic pig iron at Valley furnace and foundry iron at Chicago, Birmingham, Buffalo, Valley and Philadelphia. Quoted in gross tons

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$17.81	$28.88	$33.21	$31.36	$39.39	$31.18	$18.48	$26.78	$22.15	$22.44	$21.79	$19.44	$17.63	$18.43	$18.19	$15.90	$14.68
Feb.	17.76	29.75	33.21	31.36	42.35	28.45	18.14	27.20	22.84	22.50	21.77	19.07	17.73	18.38	18.02	15.80	14.51
March	18.06	32.18	33.21	30.10	42.24	25.18	18.35	30.11	22.81	21.99	21.65	19.03	17.73	18.36	17.75	15.71	14.45
April	18.15	38.56	32.71	27.11	43.01	23.73	20.00	30.83	22.31	20.95	20.96	19.21	17.67	18.52	17.73	15.79	14.35
May	18.08	41.87	32.71	26.91	43.64	22.78	23.35	29.74	21.40	19.85	20.69	19.09	17.45	18.70	17.60	15.76	14.12
June	17.91	47.95	32.71	26.46	44.09	21.73	23.95	28.23	20.27	19.22	20.00	18.92	17.23	18.65	17.48	15.62	14.01
July	17.79	52.11	32.73	26.37	45.44	20.22	23.86	25.96	19.31	18.96	19.51	18.56	17.10	18.48	17.16	15.56	13.76
Aug.	17.63	51.43	32.73	26.83	47.38	18.97	26.69	25.19	19.40	19.01	19.46	18.17	17.11	18.39	16.90	15.51	13.69
Sept.	17.82	46.93	32.73	27.11	47.83	19.89	31.78	25.02	19.46	19.39	19.46	18.03	17.54	18.27	16.70	15.44	13.64
Oct.	19.18	33.21	34.31	27.52	45.05	19.97	30.57	23.30	19.46	19.92	19.69	17.96	17.94	18.33	16.31	15.21	13.63
Nov.	24.36	33.21	34.36	30.34	38.65	19.79	27.82	21.40	19.79	21.16	20.13	17.59	18.46	18.36	16.21	14.97	13.59
Dec.	28.63	33.21	34.26	36.13	34.51	19.11	25.70	21.88	21.60	21.54	19.94	17.55	18.51	18.24	15.95	14.86	13.56
Aver.	*19.43*	*36.11*	*33.24*	*28.97*	*42.76*	*22.58*	*24.06*	*26.30*	*20.90*	*20.58*	*20.42*	*18.55*	*17.68*	*18.43*	*17.17*	*15.51*	*14.00*

Bessemer Pig Iron at Pittsburgh, Gross Ton

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$21.58	$35.95	$37.25	$33.60	$40.00	$33.96	$21.56	$29.27	$24.76	$24.64	$22.76	$21.26	$19.26	$20.01	$20.76	$19.26	$17.89
Feb.	21.51	35.95	37.25	33.60	42.90	31.46	21.46	29.83	25.26	24.51	22.76	20.76	19.26	20.01	20.76	19.01	17.51
March	21.75	37.70	37.25	32.54	43.40	28.16	21.46	32.02	25.14	24.06	22.76	21.16	19.26	20.14	20.76	18.76	17.39
April	21.95	42.20	36.15	29.35	43.60	26.96	22.59	32.77	24.56	22.89	21.39	21.26	19.26	20.26	20.76	18.76	17.39
May	21.95	45.15	36.15	29.35	44.03	26.16	26.36	31.87	23.89	21.76	21.14	20.96	19.06	20.76	20.76	18.76	17.09
June	21.95	54.70	36.38	29.35	44.80	24.71	26.96	30.27	22.89	20.76	20.76	20.64	18.76	20.76	20.76	18.76	16.89
July	21.95	57.45	36.60	29.35	47.15	22.84	26.77	28.46	21.96	20.76	20.39	20.26	18.76	20.76	20.36	18.76	16.89
Aug.	21.95	54.75	36.60	29.35	49.11	21.96	29.96	28.26	21.76	20.76	19.76	20.16	18.76	20.76	20.26	18.76	16.89
Sept.	22.26	48.03	36.60	29.35	50.46	21.96	35.27	28.26	21.76	21.06	20.01	19.76	18.95	20.76	20.06	18.76	16.89
Oct.	24.08	37.25	36.60	29.35	49.16	21.96	35.17	26.96	21.76	21.39	20.89	19.76	19.31	20.76	19.51	18.64	16.89
Nov.	30.15	37.25	36.60	31.26	41.10	21.96	33.52	25.26	22.13	22.64	21.66	19.76	19.95	20.76	19.26	18.26	16.89
Dec.	35.68	37.25	36.60	36.65	36.96	21.96	29.90	24.64	23.66	22.76	21.64	19.39	20.01	20.76	19.26	17.96	16.89
Aver.	*23.90*	*43.64*	*36.67*	*31.09*	*44.39*	*25.34*	*27.58*	*28.68*	*23.29*	*22.33*	*21.33*	*20.46*	*19.22*	*20.54*	*19.79*	*18.70*	*17.12*

Bessemer Pig Iron at Valley Furnace, Gross Ton

	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$38.60	$32.00	$19.60	$27.50	$23.00	$22.88	$21.00	$19.50	$17.50	$18.25	$19.00	$17.50	$16.00
Feb.	41.50	29.00	19.50	28.06	23.50	22.75	21.00	19.00	17.50	18.25	19.00	17.25	15.62
March	42.00	26.20	19.50	30.25	23.38	22.30	21.00	19.40	17.50	18.38	19.00	17.00	15.50
April	42.20	25.00	20.63	31.00	22.80	21.13	19.63	19.50	17.50	18.50	19.00	17.00	15.50
May	42.63	24.20	24.40	30.10	22.13	20.00	19.38	19.20	17.30	19.00	19.00	17.00	15.20
June	43.00	22.75	25.00	28.50	21.13	19.00	19.00	18.88	17.00	19.00	19.00	17.00	15.00
July	45.60	20.88	25.00	26.70	20.20	19.00	18.63	18.50	17.00	19.00	18.60	17.00	15.00
Aug.	47.39	20.00	28.20	26.50	20.00	19.00	18.00	18.40	17.00	19.00	18.50	17.00	15.00
Sept.	48.50	20.00	33.50	26.50	20.00	19.30	18.25	18.00	17.19	19.00	18.30	17.00	15.00
Oct.	47.25	20.00	33.40	25.20	20.00	19.63	19.13	18.00	17.55	19.00	17.75	16.88	15.00
Nov.	40.25	20.00	31.75	23.25	20.38	20.88	19.90	18.00	18.19	19.00	17.50	16.50	15.00
Dec.	35.00	20.00	28.13	22.88	21.90	21.00	19.88	17.56	18.25	19.00	17.50	16.20	15.00
Aver.	*42.82*	*23.34*	*25.63*	*27.20*	*21.53*	*20.57*	*19.57*	*18.66*	*17.46*	*18.78*	*18.51*	*16.94*	*15.23*

Basic Pig Iron at Mahoning or Shenango Valley Furnace, Gross Ton

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$17.81	$30.00	$33.00	$30.00	$37.40	$30.00	$18.15	$25.80	$21.25	$22.00	$20.00	$18.00	$17 00	$17.50	$18.50	$17.00	$15.00
Feb.	17.69	30.00	33.00	30.00	42.25	27.50	17.75	26.25	22.00	22.00	20.00	18.00	17.00	17.50	18.50	16.75	14.62
March	18 20	32.25	33.00	28.94	41.50	24.20	17.94	30.13	21.94	21.30	20.00	18.40	17.00	17.50	18.50	16.50	14.50
April	18.13	38.75	32.00	25.75	42.40	22.88	20.00	31.05	21.55	20.13	18.63	19.00	16.88	17.90	18.50	16.50	14.50
May	18.00	41.60	32.00	25.75	43.25	22.00	24.60	29.00	20.50	18.81	18.38	18.20	16.30	18.38	18.50	16.25	14.20
June	18.00	48.75	32.00	25.75	44.00	20.75	25.00	27.38	19.63	18.05	18.00	17.88	15.45	18.50	18.50	15.50	14.00
July	18.00	52.50	32.00	25.75	45.85	19.38	24.25	25.10	19.00	18.00	17.63	17.50	16.00	18.50	18.10	15.50	13.50
Aug.	18.00	51.20	32.00	25.75	48.10	18.20	26.60	24.75	19.00	18.00	17.50	17.30	16.00	18.50	18.00	15.50	13.50
Sept.	18.31	42.75	32.00	25.75	48.50	19.13	32.63	24.88	19.00	18.30	17.50	17.06	16.19	18.50	17.60	15.50	13.50
Oct.	19.88	33.00	33.00	25.75	43.75	19.19	30.90	23.50	19.00	18.63	18.00	17.00	17.10	18.50	17.00	15.25	13.50
Nov.	25.10	33.00	33.00	28.31	36.50	19.00	27.75	20.88	19.13	19.88	18.50	17.00	17.50	18.50	17.00	15.00	13.50
Dec.	30.00	33.00	33.00	34.25	33.00	18.63	24.81	21.00	20.90	20.00	18.50	17.00	17.50	18.50	17.00	15.00	13.50
Aver.	*19.76*	*38.90*	*32.50*	*27.65*	*42.21*	*21.74*	*24.20*	*25.81*	*20.24*	*19.59*	*18.55*	*17.70*	*16.66*	*18.19*	*17.98*	*15.85*	*13.98*

No. 2 Foundry Iron at Mahoning and Shenango Valley Furnace, Gross Ton

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$18.50	$31.00	$33.00	$31.00	$39.40	$31.88	$19.30	$27.00	$22.50	$22.38	$20.50	$18.50	$17.25	$17.50	$18.50	$17.00	$15.50
Feb.	18.31	32.00	33.00	31.00	41.50	28.00	18.88	27.50	23.00	22.00	20.50	18.50	17.25	17.50	18.50	16.75	15.12
March	18.50	34.75	33.00	29.94	41.25	25.90	19.00	30.50	23.00	21.10	20.50	18.50	17.25	17.75	18.50	16.50	15.00
April	18.50	39.75	33.00	26.75	42.80	24.75	20.75	31.00	21.80	20.13	19.00	18.50	17.25	18.00	18.50	17.00	15.00
May	18.20	42.40	33.00	26.75	44.25	23.50	23.80	30.20	20.75	19.13	18.88	18 50	17.20	18.50	18.50	17.00	14.70
June	18.13	50.25	33.00	26.75	45.00	22.10	24.00	27.63	19.63	18.30	17.96	18.13	16.75	18.50	18.50	17.00	14.50
July	18.25	54.50	33.00	26.75	45.00	20.13	24.25	25.50	19.00	18.50	17.69	18.00	16.65	18.50	18.10	17.00	14.50
Aug.	18.25	53.20	33.00	26.75	47.00	19.63	32.60	24.88	19.13	18.50	17.50	17.60	16.50	18.50	18.00	17.00	14.50
Sept.	18.39	47.00	33.00	26.75	49.40	21.00	34.88	24.75	19.80	18.80	17.63	17.50	16.88	18.50	17.80	17.00	14.50
Oct.	20.00	33.00	34.00	26.75	46.50	21.00	31.80	23.60	19.50	19.13	18.50	17.50	17.10	18.50	17.13	16.63	14.50
Nov.	25.00	33.00	34.00	31.50	40.25	20.75	27.88	21.88	19.50	20.39	19.00	17.45	17.63	18.50	17.00	16.00	14.50
Dec.	30.75	33.00	34.00	36.75	36.20	20.00	25.63	22.00	21.20	20.50	18.80	17.25	17.70	18.50	17.00	15.70	14.50
Aver.	*20.07*	*40.82*	*33.25*	*28.95*	*43.21*	*23.22*	*25.23*	*26.37*	*20.73*	*19.90*	*18.87*	*18.00*	*17.12*	*18.23*	*18.00*	*16.72*	*14.73*

Malleable Pig Iron, Gross Ton, f.o.b. Valley Furnace

	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$39.25	$32.00	$19.50	$27.00	$22.39	$22.39	$20.50	$18.50	$17.30	$18.00	$19.00	$17.50	$16.00
Feb.	42.75	28.75	19.00	27.63	23.00	22.00	20.50	18.50	17.25	18.00	19.00	17.25	15.62
March	42.40	25.80	19.00	30.50	22.50	21.50	20.50	18.50	17.25	18.25	19.00	17.00	15.50
April	43.25	25.00	19.50	31.00	22.10	20.63	19.00	18.50	17.25	18.50	19.00	17.00	15.50
May	43.88	24.10	24.20	30.20	21.00	19.25	18.88	18.50	17.25	19.00	19.00	17.00	15.20
June	44.20	22.75	24.50	28.13	19.88	18.50	18.05	18.13	17.00	19.00	19.00	17.00	15.00
July	45.00	20.88	25.13	25.40	19.00	18.50	17.75	18.00	17.00	19.00	18.60	17.00	14.50
Aug.	48.40	20.00	29.50	24.50	19.13	18.50	17.50	17.60	17.00	19.00	18.50	17.00	14.50
Sept.	50.00	20.13	33.50	24.50	19.80	18.80	17.63	17.50	17.19	19.00	18.30	17.00	14.50
Oct.	49.00	20.50	32.70	23.30	19.50	19.13	18.50	17.50	17.55	19.00	17.75	16.88	14.50
Nov.	39.30	20.20	29.00	20.88	19.75	20.38	19.00	17.50	18.19	19.00	17.50	16.50	14.50
Dec.	35.00	20.00	26.25	20.00	21.20	20.50	18.75	17.50	18.15	19.00	17.50	16.20	14.50
Aver.	*43.53*	*23.34*	*25.15*	*26.09*	*20.77*	*20.01*	*18.88*	*18.02*	*17.37*	*18.73*	*18.51*	*16.94*	*14.98*

No. 2 Foundry Pig Iron at Chicago Furnace, Gross Ton

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$18.50	$30.00	$33.00	$31.00	$40.00	$31.50	$18.90	$28.90	$23.70	$24.00	$23.00	$20.88	$18.50	$20.00	$20.00	$17.50	$16.50
Feb.	18.50	32.00	33.00	31.00	42.25	29.00	19.00	29.75	24.50	24.00	23.00	20.25	18.50	20.00	20.00	17.50	16.50
March	18.70	36.00	33.00	29.94	48.00	25.60	20.00	31.25	24.38	23.80	23.00	20.00	18.50	20.00	19.50	17.50	16.50
April	19.00	39.25	33.00	26.75	43.00	24.00	20.50	32.00	24.10	22.50	22.00	20.00	18.50	20.00	19.40	17.50	16.30
May	19.00	43.80	33.00	26.75	43.00	22.80	22.60	32.00	22.75	21.13	21.63	20.00	18.20	20.00	19.00	17.50	16.00
June	19.00	51.00	33.00	26.75	43.40	20.75	23.25	31.25	21.25	20.30	21.10	20.00	18.00	20.00	18.39	17.50	16.00
July	19.00	55.00	33.00	26.75	45.25	19.00	24.25	27.90	19.60	20.50	21.00	20.00	17.60	20.00	17.90	17.50	15.50
Aug.	18.40	55.00	33.00	26.75	46.00	19.55	28.60	27.00	20.38	20.50	21.00	19.50	17.63	20.00	17.50	17.50	15.50
Sept.	18.13	54.67	33.00	26.75	46.00	21.75	32.00	26.75	20.50	21.00	21.00	19.50	18.25	20.00	17.50	17.50	15.50
Oct.	19.63	33.00	34.00	27.75	44.50	21.00	31.40	25.00	20.50	21.63	21.00	19.00	18.80	20.00	17.50	17.00	15.50
Nov.	25.80	33.00	34.00	31.00	39.40	20.60	29.75	23.13	21.00	22.75	21.00	18.50	20.00	20.00	17.50	17.00	15.50
Dec.	29.50	33.00	34.00	38.75	34.50	19.63	28.00	23.00	22.50	23.00	21.00	18.50	20.00	20.00	17.50	16.70	15.50
Aver.	*20.26*	*41.31*	*33.25*	*29.16*	*42.53*	*22.93*	*24.85*	*28.16*	*22.10*	*22.09*	*21.64*	*19.68*	*18.54*	*20.00*	*18.47*	*17.35*	*15.87*

Malleable Pig Iron at Chicago Furnace, Gross Ton

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$19.00	$30.94	$33.50	$31.50	$40.50	$32.00	$18.90	$28.90	$23.88	$24.00	$23.00	$20.88	$18.50	$20.00	$20.00	$17.50	$16.50
Feb.	19.00	31.75	33.50	31.50	42.75	29.38	19.13	29.75	24.50	24.00	23.00	20.25	18.50	20.00	20.00	17.50	16.50
March	19.40	35.40	33.50	30.44	43.50	25.80	20.00	31.25	24.38	24.00	23.00	20.00	18.50	20.00	19.50	17.50	16.50
April	19.50	39.00	33.50	27.25	43.50	24.00	20.50	32.00	24.10	22.63	22.00	20.00	18.50	20.00	19.40	17.50	16.00
May	19.50	43.60	33.50	27.25	43.50	23.00	22.60	32.00	22.75	21.25	21.42	20.00	18.22	20.00	19.00	17.50	16.00
June	19.50	50.25	33.50	27.25	43.50	21.50	23.25	31.25	21.25	20.60	21.10	20.00	18.00	20.00	18.50	17.50	16.00
July	19.50	55.00	33.50	27.25	45.25	19.00	24.25	27.90	19.60	20.50	21.00	20.00	17.60	20.00	17.90	17.50	15.50
Aug.	19.00	55.00	33.50	27.25	46.50	19.60	28.60	27.00	20.38	20.50	21.00	19.50	17.63	20.00	17.50	17.50	15.50
Sept.	19.00	54.75	33.50	27.25	46.50	21.75	32.00	26.75	20.50	21.00	21.00	19.50	18.25	20.00	17.50	17.50	15.50
Oct.	19.88	33.50	34.50	28.25	45.75	21.00	31.40	25.00	20.50	21.63	21.00	19.00	18.80	20.00	17.50	17.10	15.50
Nov.	25.80	33.50	34.50	31.50	39.90	20.60	29.75	23.13	20.88	22.75	21.00	18.50	20.00	20.00	17.50	17.00	15.50
Dec.	29.50	33.50	34.50	39.50	35.00	19.63	28.00	23.00	22.62	23.00	21.00	18.50	20.00	20.00	17.50	16.70	15.50
Aver.	*20.72*	*41.35*	*33.75*	*29.68*	*43.01*	*23.11*	*24.87*	*28.16*	*22.11*	*22.15*	*21.63*	*19.68*	*18.54*	*20.00*	*18.48*	*17.36*	*15.87*

Lake Superior Charcoal Pig Iron at Chicago, Gross Ton

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$19.50	$31.75	$37.50	$38.85	$48.75	$42.50	$31.10	$33.15	$29.15	$29.04	$29.04	$27.04	$27.04	$27.04	$27.04	$27.04	$23.17
Feb.	19.75	33.75	37.50	38.85	58.38	39.50	29.38	33.90	29.15	29.04	29.04	27.04	27.04	27.04	27.04	27.04	23.17
March	19.75	36.75	37.50	38.85	58.20	38.50	26.00	35.40	29.15	29.04	29.04	27.04	27.04	27.04	25.04	26.24	23.17
April	19.75	40.25	37.50	31.75	57.25	38.50	26.50	36.53	29.15	29.04	29.04	27.04	27.04	27.04	25.04	25.04	23.17
May	19.75	48.15	37.50	31.75	57.50	37.50	28.40	36.65	29.15	29.04	29.04	27.04	27.04	27.04	25.04	25.04	23.17
June	19.75	52.88	37.62	31.75	57.50	37.50	29.75	36.65	29.12	29.04	29.04	27.04	27.04	27.04	27.04	25.04	23.17
July	19.75	57.75	38.00	31.75	57.50	36.37	31.65	34.81	29.04	29.04	29.04	27.04	27.04	27.04	27.04	25.04	23.17
Aug.	19.75	58.00	38.00	32.25	57.70	33.60	34.05	32.04	29.04	29.04	29.04	27.04	27.04	27.04	27.04	25.04	23.17
Sept.	19.75	58.00	38.00	32.75	58.50	33.00	36.15	32.04	29.04	29.04	29.04	27.04	27.04	27.04	27.04	25.04	23.17
Oct.	20.25	37.50	38.00	33.44	58.50	31.50	36.15	29.86	29.04	29.04	27.54	27.04	27.04	27.04	27.04	25.04	23.17
Nov.	26.46	37.50	38.70	38.50	55.75	31.50	36.15	28.40	29.04	29.04	27.54	27.04	27.04	27.04	27.04	25.04	23.17
Dec.	31.75	37.50	38.70	43.00	49.13	31.50	34.65	29.15	29.04	29.04	27.04	27.04	27.04	27.04	27.04	23.04	23.17
Aver.	*21.33*	*44.15*	*37.88*	*35.29*	*56.22*	*35.96*	*31.66*	*33.22*	*29.09*	*29.04*	*28.58*	*27.04*	*27.04*	*27.04*	*26.87*	*25.31*	*23.17*

Southern No. 2 Foundry Pig Iron at Birmingham, Gross Ton

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$15.00	$23.20	$33.00	$31.00	$38.75	$32.25	$16.20	$23.25	$21.50	$20.00	$22.00	$18.50	$16.00	$16.50	$14.50	$13.80	$11.50
Feb.	15.00	24.63	33.00	31.00	40.00	28.13	15.00	24.38	22.50	20.00	22.00	18.00	16.00	16.50	14.63	12.88	11.00
March	15.00	29.00	33.00	29.44	40.00	25.30	15.00	26.40	22.50	20.00	22.00	18.00	16.00	16.00	14.50	12.38	11.00
April	15.00	34.50	33.00	26.75	40.50	23.50	15.88	27.00	22.30	20.00	22.00	18.00	16.00	15.40	14.00	12.00	11.00
May	15.00	39.00	33.00	26.75	42.00	22.20	17.60	25.85	21.50	20.00	22.00	18.00	15.70	15.00	14.00	12.00	11.00
June	14.50	42.25	33.00	25.25	42.00	21.88	18.38	25.75	20.00	19.60	21.20	18.00	15.88	15.00	14.00	12.00	11.00
July	14.00	47.00	33.00	25.15	42.00	20.25	18.25	25.00	18.00	18.00	21.00	17.44	15.50	14.63	14.00	12.00	11.00
Aug.	13.80	47.00	33.00	27.38	42.00	19.00	20.10	23.70	17.50	18.00	21.00	17.25	15.69	14.50	14.00	12.00	11.00
Sept.	14.38	47.00	33.00	27.95	42.00	19.00	26.00	22.75	17.50	18.50	20.75	17.25	16.25	14.50	14.00	12.00	11.00
Oct.	15.50	33.00	34.00	28.00	42.00	19.00	26.80	20.63	17.50	19.38	20.00	17.25	16.25	14.50	14.00	12.00	11.00
Nov.	20.13	33.00	34.00	30.75	38.00	18.40	23.50	19.60	17.75	21.00	20.00	16.00	16.39	14.50	14.00	12.00	11.00
Dec.	23.00	33.00	33.40	35.20	38.00	17.33	22.88	21.00	19.80	22.00	20.00	16.00	16.50	14.50	14.00	12.00	11.00
Aver.	*15.86*	*36.05*	*33.20*	*28.72*	*40.60*	*22.19*	*19.63*	*23.86*	*19.86*	*19.71*	*21.16*	*17.47*	*16.01*	*15.13*	*14.14*	*12.27*	*11.04*

Southern No. 2 Foundry Pig Iron at Cincinnati, Gross Ton

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$17.90	$26.10	$35.90	$34.60	$41.80	$36.75	$20.70	$27.45	$25.55	$24.05	$25.69	$22.19	$19.69	$20.19	$17.69	$14.19	$14.07
Feb.	17.90	27.53	35.90	34.60	43.60	32.63	20.00	28.68	26.55	24.05	25.69	21.69	19.69	20.19	17.19	14.19	13.82
March	17.90	31.90	35.90	33.54	43.60	29.80	19.50	30.80	26.55	24.05	25.69	21.69	19.69	19.69	16.69	14.19	13.82
April	17.90	37.40	35.90	30.65	44.00	28.00	20.38	31.05	26.35	24.05	25.69	21.69	19.69	19.09	16.69	14.19	13.82
May	17.90	41.90	35.90	29.85	45.60	26.70	22.10	30.75	25.55	24.05	25.69	21.69	19.39	18.69	16.69	14.69	13.82
June	17.34	45.15	36.08	28.39	45.60	26.38	23.00	29.30	24.05	23.25	24.59	21.69	19.56	18.69	16.69	14.69	13.82
July	16.90	49.90	36.60	28.35	45.60	24.75	22.30	28.85	22.05	22.18	24.19	21.13	19.19	17.99	16.39	14.69	13.82
Aug.	16.70	49.90	36.60	30.40	45.78	23.50	24.35	27.68	21.55	22.55	24.19	20.94	19.39	17.57	15.82	14.69	13.82
Sept.	17.28	49.90	36.60	31.25	46.50	23.50	29.55	26.55	21.55	22.85	24.07	20.94	19.94	17.19	15.49	14.69	13.82
Oct.	18.03	49.38	37.60	31.60	46.50	23.50	30.85	24.68	21.55	23.43	23.69	20.94	19.94	17.30	15.19	14.69	13.82
Nov.	22.40	35.90	37.60	34.35	42.50	22.90	27.55	23.65	21.80	24.87	23.69	19.69	20.07	17.69	14.94	14.69	13.82
Dec.	25.90	35.90	37.60	38.60	42.50	21.75	26.93	25.05	23.85	25.49	23.69	19.69	20.19	17.69	14.39	14.69	13.82
Aver.	*18.67*	*40.07*	*36.52*	*32.16*	*44.47*	*26.68*	*23.93*	*27.87*	*23.91*	*23.74*	*24.71*	*21.16*	*19.70*	*18.51*	*16.16*	*14.52*	*13.84*

Eastern Pennsylvania No. 2X Foundry Pig Iron at Philadelphia, Gross Ton

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$19.94	$30.10	$34.25	$36.15	$44.10	$33.34	$21.34	$29.76	$24.11	$25.01	$24.26	$22.76	$20.56	$21.76	$21.26	$18.26	$16.14
Feb.	20.00	31.88	34.25	36.15	45.10	31.09	21.09	30.01	24.04	25.01	24.14	22.26	21.14	21.76	21.26	18.26	16.14
March	20.05	37.31	34.25	34.39	45.53	27.59	21.26	32.30	24.16	24.21	23.36	22.26	21.26	21.89	20.76	18.26	16.12
April	20.50	41.38	34.25	31.90	46.85	26.26	23.62	32.95	23.06	22.82	23.26	22.26	21.26	22.26	20.76	18.26	16.09
May	20.50	43.60	34.25	30.70	47.10	25.71	26.09	32.76	22.67	21.51	22.89	22.26	21.26	22.26	20.39	17.76	15.34
June	19.94	48.19	34.29	29.50	47.15	25.50	27.06	30.76	21.85	21.26	22.66	22.14	21.26	22.26	20.26	17.71	15.34
July	19.75	53.13	34.40	29.08	48.15	23.55	27.92	27.68	21.26	21.26	22.26	21.51	20.86	22.16	19.96	17.51	14.84
Aug.	19.55	53.00	34.40	29.60	51.96	20.64	32.26	25.89	21.51	21.57	22.26	21.26	20.76	21.76	19.76	17.32	14.54
Sept.	19.50	51.67	34.40	30.70	53.51	21.22	34.83	26.26	21.76	21.96	22.26	20.76	21.01	21.76	19.56	16.86	14.34
Oct.	20.31	34.25	38.85	32.10	52.53	22.23	32.54	24.04	21.76	22.64	22.26	20.51	21.26	21.76	19.26	16.64	14.28
Nov.	24.90	34.25	39.15	35.35	44.99	22.74	30.39	23.01	22.64	23.64	23.56	20.26	21.64	21.76	19.01	16.07	14.09
Dec.	29.25	34.25	39.15	40.10	35.54	21.82	28.86	24.26	24.56	24.26	23.39	20.26	21.76	21.46	18.26	16.01	13.84
Aver.	*21.18*	*41.08*	*35.49*	*32.98*	*46.88*	*25.14*	*27.27*	*28.31*	*22.78*	*22.93*	*23.05*	*21.55*	*21.17*	*21.90*	*20.04*	*17.41*	*15.09*

Basic Pig Iron, Delivered Eastern Pennsylvania

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$19.50	$30.00	$33.75	$33.90	$39.19	$33.51	$20.18	$27.80	$23.00	$24.25	$23.00	$21.50	$19.50	$19.75	$19.50	$17.25	$16.25
Feb.	19.50	30.50	33.75	33.90	41.90	30.65	19.84	28.19	22.69	23.88	23.00	21.19	19.50	19.88	19.44	17.25	16.25
March	19.62	33.50	33.75	32.84	44.24	26.15	22.61	29.56	21.81	23.55	22.10	20.85	19.50	20.25	19.06	17.25	16.00
April	20.62	37.50	32.75	29.65	44.80	25.00	21.00	30.81	21.50	22.31	21.75	20.75	19.50	20.25	18.90	17.13	16.00
May	20.50	39.70	32.75	29.65	44.80	25.00	24.00	30.60	21.00	21.13	21.75	20.75	19.10	20.25	18.75	17.00	16.00
June	19.69	46.00	32.79	26.54	44.66	24.63	25.00	28.14	21.00	21.50	21.45	20.75	19.00	20.25	18.75	17.00	16.00
July	19.12	50.40	32.90	26.12	43.70	22.38	25.75	26.60	20.20	21.50	21.00	20.75	18.95	20.20	18.45	16.75	15.50
Aug.	19.15	50.00	32.90	26.60	47.21	19.70	27.23	25.00	20.00	20.50	20.95	20.15	18.75	19.75	18.25	16.75	14.20
Sept.	19.75	45.44	32.90	26.60	51.26	19.19	30.83	25.00	20.00	20.70	20.75	20.00	18.88	19.75	18.15	16.75	13.50
Oct.	20.60	33.75	36.60	28.00	49.60	20.50	29.30	24.20	20.00	21.25	20.69	20.00	19.45	19.75	17.75	16.75	13.50
Nov.	26.00	33.75	36.90	30.38	41.94	20.70	27.83	22.88	21.13	22.39	22.60	19.60	19.75	19.75	17.75	16.39	13.50
Dec.	30.00	33.75	36.90	35.00	44.15	20.63	27.31	23.13	23.41	23.00	22.00	19.25	20.05	19.55	17.75	16.25	13.50
Aver.	*21.17*	*38.69*	*34.05*	*29.93*	*44.79*	*24.00*	*25.08*	*26.33*	*21.31*	*22.16*	*21.75*	*20.46*	*19.33*	*19.95*	*18.54*	*16.87*	*15.02*

No. 2 Foundry Pig Iron at Cleveland, f.o.b. Furnace, Gross Ton

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$19.30	$31.10	$33.30	$31.40	$40.00	$33.40	$20.06	$27.37	$23.20	$23.37	$21.82	$19.00	$18.00	$19.00	$19.00	$17.50	$16.00
Feb.	19.23	32.93	33.30	31.40	41.90	30.22	20.06	28.50	24.00	23.49	21.88	18.63	18.00	19.00	19.00	17.50	16.00
March	19.05	37.06	33.30	30.58	43.15	27.30	21.55	31.65	24.00	23.97	21.31	19.40	18.00	19.00	19.00	17.20	15.70
April	19.36	40.27	33.30	27.15	43.40	26.62	20.81	32.02	23.75	22.32	20.35	19.37	18.06	19.00	18.88	17.00	15.50
May	19.45	42.90	33.30	27.15	44.53	25.50	23.75	31.71	22.75	20.37	19.50	19.00	18.00	19.00	18.50	17.00	15.50
June	19.07	50.63	33.32	27.15	44.90	24.00	24.06	29.96	21.00	19.62	19.19	18.70	17.88	19.00	18.50	17.00	15.50
July	18.79	55.80	33.40	27.15	45.20	21.31	24.75	26.94	19.75	19.50	19.00	18.50	17.50	19.00	18.00	17.00	15.50
Aug.	18.76	55.17	33.40	27.40	48.06	20.50	31.31	25.90	20.06	19.50	19.00	18.50	17.50	19.00	18.00	17.00	15.50
Sept.	18.92	53.15	33.40	27.65	49.86	20.75	35.94	25.37	20.31	19.50	19.00	18.50	17.88	19.00	17.60	17.00	15.00
Oct.	20.12	33.30	34.40	28.15	47.88	20.75	33.59	24.75	20.50	20.05	19.37	18.38	18.13	19.00	17.50	17.00	15.00
Nov.	26.20	33.30	34.40	31.90	43.46	20.56	29.97	22.85	20.81	21.82	20.10	18.00	19.00	19.00	17.50	17.00	15.00
Dec.	31.13	33.30	34.40	36.90	36.32	19.95	26.75	22.56	21.88	21.76	19.88	18.00	19.00	19.00	17.50	16.60	15.00
Aver.	*20.78*	*41.58*	*33.60*	*29.67*	*44.06*	*24.28*	*26.05*	*27.47*	*21.84*	*21.19*	*20.03*	*18.67*	*18.16*	*19.00*	*18.25*	*17.07*	*15.43*

No. 2 Foundry Pig Iron at Buffalo Furnace, Gross Ton

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$18.75	$34.94	$33.00	$31.00	$40.90	$32.38	$19.44	$26.94	$22.25	$23.00	$21.00	$18.50	$17.00	$18.00	$18.75	$17.50	$16.00
Feb.	18.53	35.25	33.00	31.00	42.00	30.50	18.87	27.56	22.25	22.75	21.00	17.39	17.00	18.39	18.50	17.50	16.00
March	18.72	38.45	33.00	29.94	44.75	29.00	18.30	29.05	21.81	22.12	21.00	17.05	17.00	18.50	18.50	17.50	16.00
April	18.88	42.62	33.00	26.75	45.00	26.15	20.81	29.56	21.37	20.65	21.00	17.50	17.00	18.50	18.50	17.50	16.00
May	18.78	44.95	33.00	26.75	45.00	25.62	22.62	29.40	20.25	19.00	20.75	17.50	17.00	18.50	18.50	17.13	16.00
June	18.65	48.31	33.00	26.75	44.75	23.42	23.05	29.06	19.37	19.00	19.60	17.39	17.00	18.75	18.50	17.00	16.00
July	18.70	52.25	33.00	26.63	45.00	20.87	24.50	26.00	19.00	18.85	19.00	16.94	17.00	19.50	18.50	17.00	16.00
Aug.	18.63	53.00	33.00	27.77	47.75	19.50	30.70	24.95	19.19	18.72	19.00	16.20	17.00	19.50	18.50	17.00	16.00
Sept.	19.00	53.00	33.00	28.25	50.10	20.00	33.94	24.87	19.37	18.75	19.00	16.25	17.00	19.50	18.50	17.00	16.00
Oct.	20.37	33.00	34.00	28.70	47.44	20.37	31.12	23.06	19.05	19.40	19.00	16.88	17.10	19.50	17.75	17.00	16.00
Nov.	27.25	33.00	34.00	34.30	42.56	19.12	27.80	20.87	20.50	21.19	19.00	17.00	17.88	19.50	17.50	17.00	16.00
Dec.	32.75	33.00	34.00	38.25	36.60	19.30	25.50	21.56	22.62	21.50	19.00	17.00	18.00	19.50	17.50	16.80	16.00
Aver.	*20.75*	*41.81*	*33.25*	*29.67*	*44.32*	*23.85*	*24.72*	*26.07*	*20.59*	*20.41*	*19.86*	*17.13*	*17.17*	*18.97*	*18.29*	*17.16*	*16.00*

No. 2 Foundry Pig Iron at St. Louis, Gross Ton

	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$31.61	$25.68	$25.06	$24.56	$22.31	$20.56	$20.75	$20.50	$18.25	$18.33
Feb.	31.81	26.56	26.06	24.56	22.06	20.56	20.75	20.50	18.25	18.33
March	33.43	26.56	26.06	24.56	21.86	20.56	20.75	20.44	18.25	18.33
April	34.31	26.56	24.37	24.00	21.56	20.56	20.75	20.25	18.25	18.33
May	34.31	24.31	22.50	23.56	21.56	19.81	20.75	19.75	18.25	18.33
June	33.56	23.68	21.56	23.16	21.31	19.81	20.75	19.75	18.25	18.33
July	30.15	22.01	21.56	23.06	21.06	19.76	20.75	19.10	18.25	18.33
Aug.	29.06	22.12	21.81	23.06	20.56	19.68	20.69	19.00	18.25	18.33
Sept.	29.31	22.46	22.96	23.06	20.56	20.31	20.50	18.70	18.25	18.33
Oct.	27.21	22.56	23.62	22.56	20.56	20.56	20.50	18.25	18.25	18.33
Nov.	25.93	22.56	24.12	22.36	20.56	20.87	20.50	18.25	18.25	18.33
Dec.	26.61	24.26	24.56	22.56	20.56	20.81	20.50	18.25	18.25	18.33
Aver.	*30.61*	*24.11*	*23.69*	*23.42*	*21.21*	*20.33*	*20.66*	*19.39*	*18.25*	*18.33*

Monthly Averages of Ferroalloy Quotations

Ferromanganese (80 *Per Cent*), *Gross Ton, at Seaboard*

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan. ..	$150.00	$175.00	$250.00	$255.00	$146.00	$112.50	$58.35	$105.00	$108.70	$112.50	$115.00	$100.00	$100.00	$105.00	$100.00	$80.00	$75.00
Feb. ..	207.50	231.25	250.00	215.00	172.50	100.00	60.42	107.50	107.50	115.00	115.00	100.00	100.00	105.00	95.50	80.00	75.00
March..	349.60	290.00	250.00	175.00	216.25	96.00	62.50	113.75	107.50	115.00	97.60	100.00	100.00	105.00	94.00	80.00	75.00
April ..	406.25	362.50	290.00	150.00	240.00	90.00	64.37	120.00	107.50	115.00	88.00	100.00	100.00	105.00	94.00	80.00	75.00
May ..	387.50	420.50	290.00	138.40	250.00	85.00	66.87	128.00	107.50	115.00	88.00	94.00	103.00	105.00	94.00	80.00	75.00
June ..	270.00	443.75	290.00	121.00	225.00	80.00	67.50	128.75	107.50	115.00	88.00	90.00	105.00	105.00	94.00	80.00	68.00
July ..	175.00	406.25	290.00	111.00	225.00	70.60	67.50	*119.50	106.50	115.00	88.00	90.00	105.00	105.00	94.00	80.00	68.00
Aug. ..	172.00	400.00	290.00	101.25	198.75	70.00	67.50	117.50	95.75	115.00	88.00	90.00	105.00	105.00	94.00	80.00	68.00
Sept. ..	169.75	387.50	285.00	98.75	170.00	65.80	75.63	*111.25	90.00	115.00	88.00	90.00	105.00	105.00	94.00	80.00	68.00
Oct. ...	162.25	310.00	285.00	105.00	170.00	63.00	100.00	*110.00	90.00	115.00	88.00	90.00	105.00	105.00	94.00	80.00	68.00
Nov. ..	160.80	256.00	285.00	112.50	170.00	61.50	100.00	*108.75	98.75	115.00	96.60	90.00	105.00	105.00	94.00	80.00	68.00
Dec. ..	169.75	243.75	275.00	122.50	135.00	60.00	100.00	*108.25	107.00	115.00	100.00	100.00	105.00	105.00	82.80	73.60	68.00
Aver. .	*231.70*	*327.21*	*277.50*	*142.12*	*193.21*	*79.53*	*74.22*	*114.85*	*102.85*	*114.79*	*95.02*	*94.50*	*103.17*	*105.00*	*93.70*	*79.47*	*70.92*

*Price at furnace, where lower than price at seaboard.

Spiegeleisen (19 *to* 21 *Per Cent*), *Gross Ton, at Furnace*

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan. ..	$30.38	$60.00	$60.00	$66.00	$51.40	$45.00	$26.00	$34.40	$38.00	$33.00	$32.00	$37.00	$30.80	$31.00	$31.00	$28.00	$26.00
Feb. ..	36.25	68.75	61.25	60.75	58.75	40.00	38.00	35.50	38.00	33.00	32.00	37.00	31.00	31.00	31.00	28.00	26.00
March..	57.00	75.00	71.25	47.00	60.00	35.00	29.40	40.00	38.00	33.00	32.00	37.00	31.00	31.00	31.00	28.00	26.00
April ..	65.00	75.00	80.75	45.00	67.60	34.00	32.25	45.00	36.80	33.00	32.00	37.00	31.00	31.00	31.00	28.00	26.00
May ..	65.00	81.00	84.00	37.40	75.00	32.00	35.00	52.50	36.00	33.00	32.00	36.25	31.00	31.00	31.00	28.00	26.00
June ..	61.00	82.50	89.00	31.25	75.00	32.00	36.00	48.50	35.00	32.80	32.00	35.50	31.00	31.00	31.00	28.00	25.75
July ..	52.50	85.00	89.00	35.00	75.00	27.00	36.00	44.00	34.20	32.00	32.00	33.50	31.00	31.00	31.00	28.00	25.00
Aug. ..	45.00	85.00	89.00	35.00	80.00	26.00	37.80	46.75	32.50	32.00	32.00	33.00	32.50	31.00	31.00	28.00	25.00
Sept. ..	45.00	82.50	83.75	35.00	82.00	26.00	38.25	43.75	31.40	31.80	32.00	33.00	33.00	31.00	31.00	28.00	25.00
Oct. ...	42.75	76.25	82.00	35.00	81.88	26.00	38.00	43.75	30.75	31.25	32.00	30.75	33.00	31.00	31.00	28.00	25.00
Nov. ..	45.40	66.00	80.25	37.00	75.62	26.00	37.50	41.25	30.25	32.00	37.40	30.00	30.00	31.00	30.50	28.00	24.40
Dec. ..	55.00	60.00	74.38	40.00	59.10	26.00	37.50	39.00	32.00	32.00	36.50	30.00	31.00	31.00	28.40	26.20	24.00
Aver. .	*50.02*	*74.75*	*78.72*	*42.03*	*70.11*	*31.25*	*34.31*	*42.87*	*34.41*	*32.40*	*32.83*	*34.17*	*31.36*	*31.00*	*30.74*	*27.85*	*25.35*

50 Per Cent Ferrosilicon (Gross Ton, Delivered East of Mississippi River)

	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$80.00	$75.00	$54.00	$82.50	$75.00	$82.50	$85.00	$85.00	$83.50	$83.50	$83.50	$83.50	$77.50
Feb.	85.00	93.00	55.00	83.75	75.00	82.50	85.00	85.00	83.50	83.50	83.50	83.50	77.50
March .	85.00	92.40	55.00	90.00	75.00	82.50	85.00	85.00	83.50	83.50	83.50	83.50	77.50
April	85.00	86.25	55.00	92.50	75.00	82.50	85.00	85.00	83.50	83.50	83.50	83.50	77.50
May	80.00	76.40	55.00	94.50	75.00	82.50	85.00	85.00	83.50	83.50	83.50	83.50	77.50
June	80.00	69.75	55.00	90.00	75.00	82.50	85.00	85.00	83.50	83.50	83.50	83.50	77.50
July	80.00	66.00	55.00	82.50	71.00	82.50	85.00	85.00	83.50	83.50	83.50	83.50	77.50
Aug.	75.00	60.80	55.00	82.50	71.25	82.50	85.00	85.00	83.50	83.50	83.50	83.50	77.50
Sept.	75.00	60.00	55.00	82.50	72.00	82.50	85.00	85.00	83.50	83.50	83.50	83.50	77.50
Oct.	75.00	58.50	67.00	81.00	71.00	82.50	85.00	85.00	83.50	83.50	83.50	83.50	77.50
Nov.	75.00	55.80	75.00	80.63	70.00	82.50	85.00	85.00	83.50	83.50	83.50	83.50	77.50
Dec.	75.00	56.00	82.50	76.25	75.00	82.50	85.00	83.50	83.50	83.50	83.50	78.70	77.50
Aver. ..	*79.17*	*70.83*	*59.88*	*84.89*	*73.35*	*82.50*	*85.00*	*84.88*	*83.50*	*83.50*	*83.50*	*83.10*	*77.50*

Connellsville Coke Prices for Twenty Years

Prompt Connellsville Furnace Coke, Net Ton at Oven

	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan. ...	$3.88	$1.85	$1.50	$2.94	$9.50	$6.00	$5.65	$6.00	$5.06	$2.75	$8.05	$3.94	$3.94	$7.19	$3.50	$2.70	$2.75	$2.55	$2.50	$2.25
Feb. ..	2.52	1.85	1.50	3.38	9.62	6.00	4.44	6.00	4.50	3.04	7.13	4.08	3.63	7.31	3.38	2.68	2.90	2.60	2.50	2.25
March..	2.40	1.90	1.50	3.47	9.60	6.00	4.06	6.00	4.35	3.25	7.25	4.08	3.35	3.05	3.35	2.60	2.98	2.60	2.50	2.25
April ..	2.15	1.86	1.50	2.41	7.38	6.00	3.65	9.60	3.50	4.48	6.31	3.75	3.04	3.00	3.20	2.60	2.78	2.60	2.50	2.25
May ..	2.13	1.77	1.50	2.30	7.80	6.00	3.69	12.00	3.25	6.00	5.15	3.25	3.00	2.91	2.94	2.60	2.75	2.53	2.45	2.20
June ..	2.11	1.75	1.56	2.49	11.25	6.00	4.00	15.00	3.00	6.75	4.75	3.19	2.77	2.83	2.93	2.60	2.75	2.50	2.40	2.00
July ..	2.45	1.75	1.64	2.75	12.75	6.00	4.07	17.20	2.81	10.75	4.55	3.00	2.83	2.84	3.00	2.63	2.75	2.50	2.40	2.00
Aug. ..	2.50	1.70	1.50	2.80	13.60	6.00	4.31	17.75	2.75	12.80	4.56	3.00	3.06	2.95	3.00	2.75	2.73	2.58	2.40	2.00
Sept. ..	2.29	1.65	1.61	2.94	11.12	6.00	4.56	16.70	3.15	11.13	4.50	3.00	3.49	3.38	2.85	2.75	2.65	2.60	2.40	2.00
Oct. ...	2.98	1.60	2.03	4.88	6.00	6.00	4.52	15.12	3.28	9.60	3.85	3.00	6.13	3.63	2.85	2.83	2.65	2.60	1.40	1.81
Nov. ..	1.82	1.52	2.28	6.90	6.00	6.00	5.87	8.26	3.03	7.19	3.81	3.04	5.75	4.43	2.77	2.75	2.65	2.53	2.40	1.75
Dec. ..	1.75	1.50	2.64	8.38	6.00	6.00	6.12	6.20	2.75	7.00	4.00	3.68	4.32	3.50	2.75	2.75	2.63	2.50	2.34	1.75
Aver. .	*2.42*	*1.73*	*1.73*	*3.80*	*9.22*	*6.00*	*4.58*	*11.32*	*3.45*	*7.01*	*5.33*	*3.42*	*3.78*	*3.92*	*3.14*	*2.69*	*2.75*	*2.56*	*2.43*	*2.04*

Prompt Connellsville Foundry Coke, Net Ton at Oven

	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan. ...	$4.40	$2.50	$2.00	$3.50	$9.75	$7.00	$6.25	$7.00	$6.38	$3.75	$8.70	$4.75	$4.88	$7.75	$4.50	$3.75	$3.75	$3.50	$3.50	$3.50
Feb. ..	3.25	2.50	2.00	3.50	11.00	7.00	5.00	7.00	5.63	4.00	8.25	4.88	4.31	8.31	4.31	3.75	3.75	3.50	3.50	3.50
March..	3.00	2.45	2.00	3.75	11.60	7.00	4.94	7.00	5.45	4.25	8.38	4.88	4.15	4.40	4.40	3.75	3.75	3.50	3.50	3.50
April ..	3.00	2.40	2.00	3.56	9.13	7.00	4.30	10.20	4.75	5.06	7.56	4.75	4.00	4.06	4.06	3.75	3.75	3.50	3.50	3.50
May ..	2.85	2.40	2.00	3.25	8.90	7.00	4.31	13.00	4.50	6.30	6.15	4.69	4.00	4.00	4.00	3.75	3.75	3.50	3.50	3.10
June ..	2.80	2.32	2.00	3.25	11.72	7.00	4.56	15.75	4.45	7.25	5.56	4.38	4.80	4.00	4.00	3.75	3.75	3.50	3.50	3.00
July ..	2.70	2.22	2.05	3.25	13.25	7.00	5.00	17.80	4.06	11.00	5.35	4.10	3.75	4.00	4.00	3.75	3.75	3.50	3.50	3.00
Aug. ..	2.90	2.25	2.00	3.30	13.20	7.00	5.25	18.88	3.75	13.90	5.38	4.00	3.88	4.00	4.00	3.75	3.75	3.50	3.50	2.90
Sept. ..	2.90	2.10	2.07	3.31	11.75	7.00	5.80	17.70	4.15	12.50	5.50	4.00	4.25	4.38	4.00	3.75	3.75	3.50	3.50	2.75
Oct. ...	2.81	2.00	2.35	3.88	6.00	7.00	6.25	16.38	4.38	11.70	4.80	4.00	6.31	4.63	4.00	3.75	3.75	3.50	3.50	2.75
Nov. ..	2.60	1.92	2.88	7.10	7.00	7.00	7.00	9.50	4.19	8.38	4.81	4.06	6.81	5.50	3.85	3.75	3.75	3.50	3.50	2.75
Dec. ..	2.50	1.90	2.95	8.63	7.00	7.00	7.00	7.00	3.81	7.88	4.81	4.55	5.20	4.50	3.75	3.75	3.50	3.50	3.25	2.69
Aver. .	*2.98*	*2.25*	*2.19*	*4.19*	*10.03*	*7.00*	*5.47*	*12.27*	*4.63*	*8.00*	*6.27*	*4.42*	*4.61*	*4.96*	*4.11*	*3.75*	*3.75*	*3.50*	*3.48*	*3.08*

Composite Price of Finished Steel

Average of THE IRON AGE quotations on steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets for period prior to 1920; hot-rolled strip added for subsequent period. Quoted in cents a pound

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	2.06	3.384	3.549	3.371	3.202	3.087	2.052	2.494	2.81	2.521	2.429	2.365	2.224	2.286	2.231	2.032	1.937
Feb.	2.203	3.501	3.549	3.371	3.628	2.965	2.002	2.637	2.808	2.521	2.412	2.296	2.271	2.286	2.212	2.037	1.926
March	2.447	3.739	3.549	3.282	3.916	2.787	1.995	2.768	2.767	2.52	2.416	2.302	2.273	2.286	2.215	2.032	1.939
April	2.611	4.110	3.549	3.031	4.08	2.74	2.063	2.87	2.696	2.465	2.421	2.296	2.27	2.317	2.158	2.024	1.97
May	2.75	4.562	3.549	3.021	4.015	2.762	2.123	2.856	2.647	2.427	2.401	2.296	2.249	2.317	2.124	2.012	1.97
June	2.689	5.004	3.549	3.021	3.974	2.64	2.18	2.852	2.596	2.41	2.405	2.304	2.236	2.317	2.11	2.008	1.971
July	2.64	5.334	3.549	3.021	4.087	2.523	2.211	2.832	2.555	2.405	2.415	2.302	2.222	2.317	2.079	2.024	1.976
Aug.	2.682	5.249	3.549	3.021	4.171	2.346	2.325	2.802	2.494	2.39	2.415	2.302	2.242	2.307	2.062	2.014	1.971
Sept.	2.765	5.049	3.549	3.004	4.165	2.239	2.461	2.802	2.457	2.372	2.39	2.293	2.242	2.301	2.053	2.014	1.965
Oct.	2.856	3.470	3.55	3.052	3.987	2.206	2.516	2.802	2.437	2.382	2.399	2.246	2.263	2.28	2.038	2.013	1.97
Nov.	3.021	3.444	3.549	3.084	3.717	2.131	2.49	2.802	2.452	2.416	2.402	2.216	2.274	2.273	2.035	2.008	1.948
Dec.	3.278	3.441	3.461	3.11	3.18	2.094	2.471	2.786	2.504	2.431	2.402	2.217	2.281	2.273	2.021	1.978	1.948
Aver.	*2.671*	*4.188*	*3.542*	*3.115*	*3.843*	*2.543*	*2.241*	*2.775*	*2.602*	*2.438*	*2.409*	*2.286*	*2.254*	*2.297*	*2.111*	*2.016*	*1.957*

Soft Steel Bars at Pittsburgh, Cents a Pound

	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	1.70	1.20	1.10	2.03	3.15	2.90	2.70	2.75	2.35	1.50	2.04	2.40	2.10	2.00	1.98	1.81	1.90	1.89	1.64	1.50
Feb.	1.70	1.20	1.10	2.31	3.25	2.90	2.70	3.00	2.15	1.39	2.20	2.40	2.10	2.00	1.90	1.85	1.90	1.85	1.65	1.50
March	1.85	1.20	1.15	2.65	3.63	2.90	2.61	3.63	2.00	1.39	2.39	2.40	2.10	2.00	1.90	1.85	1.90	1.85	1.65	1.52
April	1.84	1.15	1.20	2.88	3.75	2.90	2.35	3.75	2.05	1.50	2.50	2.29	2.05	2.00	1.89	1.85	1.95	1.79	1.65	1.60
May	1.70	1.14	1.20	3.00	4.00	2.90	2.35	3.63	2.10	1.58	2.40	2.24	2.00	1.95	1.85	1.85	1.95	1.75	1.65	1.60
June	1.60	1.11	1.21	2.75	4.25	2.90	2.35	3.50	2.05	1.70	2.40	2.20	2.00	2.00	1.81	1.85	1.95	1.73	1.65	1.60
July	1.50	1.12	1.25	2.63	4.50	2.90	2.35	3.50	1.84	1.70	2.40	2.15	2.00	2.00	1.80	1.85	1.95	1.65	1.63	1.60
Aug.	1.40	1.19	1.30	2.56	4.30	2.90	2.35	3.25	1.74	1.88	2.40	2.13	1.95	2.00	1.80	1.90	1.95	1.64	1.60	1.60
Sept.	1.40	1.20	1.34	2.60	4.00	2.90	2.35	3.25	1.63	2.00	2.40	2.04	1.92	2.00	1.78	1.90	1.94	1.61	1.60	1.60
Oct.	1.39	1.15	1.44	2.75	2.90	2.90	2.39	3.13	1.55	2.00	2.40	2.00	2.00	2.00	1.75	1.91	1.90	1.60	1.60	1.60
Nov.	1.29	1.10	1.62	2.83	2.90	2.90	2.69	2.87	1.50	2.00	2.40	2.03	2.00	2.00	1.77	1.94	1.90	1.60	1.60	1.60
Dec.	1.21	1.07	1.84	3.00	2.90	2.80	2.75	2.35	1.50	2.00	2.40	2.10	2.00	2.00	1.80	1.90	1.90	1.60	1.58	1.60
Aver.	*1.55*	*1.15*	*1.31*	*2.67*	*3.63*	*2.89*	*2.50*	*3.22*	*1.87*	*1.72*	*2.36*	*2.20*	*2.02*	*2.00*	*1.84*	*1.87*	*1.92*	*1.71*	*1.63*	*1.57*

Tank Plates at Pittsburgh, Cents a Pound

	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	1.75	1.20	1.10	2.25	4.45	3.25	3.00	2.72	2.65	1.48	2.06	2.50	2.00	1.86	1.90	1.81	1.90	1.83	1.64	1.50
Feb.	1.71	1.20	1.10	2.56	4.88	3.25	3.00	3.50	2.33	1.39	2.23	2.45	2.00	1.80	1.86	1.85	1.90	1.80	1.65	1.50
March	1.70	1.18	1.10	3.10	5.25	3.25	2.91	3.63	2.04	1.39	2.39	2.39	2.00	1.86	1.85	1.85	1.90	1.80	1.65	1.52
April	1.68	1.15	1.15	3.56	5.88	3.25	2.65	3.75	2.10	1.48	2.50	2.28	2.00	1.90	1.85	1.85	1.95	1.80	1.65	1.60
May	1.60	1.12	1.15	3.75	6.60	3.25	2.65	3.75	2.20	1.56	2.50	2.20	2.00	1.86	1.84	1.85	1.95	1.73	1.65	1.60
June	1.45	1.10	1.16	3.63	8.00	3.25	2.65	3.55	1.95	1.63	2.50	2.18	1.92	1.88	1.80	1.85	1.95	1.69	1.65	1.60
July	1.45	1.10	1.22	3.44	9.00	3.25	2.65	3.38	1.85	1.70	2.50	2.09	1.90	1.90	1.80	1.85	1.95	1.65	1.63	1.60
Aug.	1.44	1.18	1.26	3.70	8.80	3.25	2.65	3.25	1.78	1.88	2.50	1.95	1.85	1.90	1.80	1.90	1.95	1.61	1.60	1.60
Sept.	1.40	1.20	1.34	4.00	8.00	3.25	2.53	3.25	1.64	2.13	2.50	1.82	1.80	1.90	1.78	1.90	1.95	1.60	1.60	1.60
Oct.	1.36	1.14	1.44	4.00	3.25	3.25	2.61	3.09	1.60	2.11	2.50	1.80	1.80	1.90	1.75	1.90	1.94	1.60	1.60	1.60
Nov.	1.26	1.08	1.65	4.15	3.25	3.25	2.65	2.81	1.54	1.99	2.50	1.83	1.86	1.90	1.77	1.90	1.90	1.60	1.60	1.60
Dec.	1.20	1.05	2.04	4.25	3.25	3.13	2.65	2.65	1.50	1.95	2.50	1.92	1.90	1.90	1.80	1.90	1.90	1.60	1.54	1.60
Aver.	*1.50*	*1.14*	*1.31*	*3.53*	*5.88*	*3.24*	*2.72*	*3.28*	*1.93*	*1.72*	*2.43*	*2.12*	*1.91*	*1.88*	*1.82*	*1.87*	*1.93*	*1.69*	*1.62*	*1.57*

Structural Shapes at Pittsburgh, Cents a Pound

	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	1.75	1.20	1.10	1.90	3.25	3.00	2.80	2.47	2.45	1.50	2.06	2.50	2.10	1.90	1.98	1.81	1.90	1.83	1.64	1.50
Feb.	1.71	1.20	1.10	2.06	3.25	3.00	2.80	2.70	2.26	1.39	2.20	2.50	2.10	1.90	1.90	1.85	1.90	1.80	1.65	1.50
March	1.70	1.19	1.10	2.40	3.54	3.00	2.71	3.13	2.08	1.39	2.39	2.39	2.10	1.90	1.90	1.85	1.90	1.80	1.65	1.52
April	1.68	1.15	1.20	2.55	3.88	3.00	2.45	3.25	2.10	1.50	2.50	2.29	2.05	1.90	1.88	1.85	1.95	1.80	1.65	1.60
May	1.50	1.14	1.20	2.60	4.00	3.00	2.45	3.10	2.20	1.56	2.50	2.24	2.00	1.90	1.80	1.85	1.95	1.73	1.65	1.60
June	1.45	1.11	1.20	2.53	4.31	3.00	2.45	3.10	2.10	1.63	2.50	2.20	2.00	1.94	1.80	1.85	1.95	1.69	1.65	1.60
July	1.45	1.12	1.25	2.50	4.50	3.00	2.45	3.10	1.93	1.70	2.50	2.09	2.00	2.00	1.80	1.85	1.95	1.65	1.63	1.60
Aug.	1.45	1.19	1.30	2.52	4.30	3.00	2.45	3.10	1.82	1.88	2.50	2.00	1.95	2.00	1.80	1.90	1.95	1.61	1.60	1.60
Sept.	1.41	1.20	1.35	2.64	4.00	3.00	2.45	3.10	1.64	2.00	2.50	2.00	1.90	2.00	1.78	1.90	1.94	1.60	1.60	1.60
Oct.	1.37	1.15	1.44	2.75	3.00	3.00	2.45	3.05	1.60	2.00	2.50	1.93	1.90	2.00	1.75	1.90	1.90	1.60	1.60	1.60
Nov.	1.29	1.10	1.60	2.86	3.00	3.00	2.45	2.89	1.54	2.00	2.50	2.00	1.90	2.00	1.77	1.90	1.90	1.60	1.60	1.60
Dec.	1.25	1.07	1.78	3.25	3.00	2.90	2.45	2.45	1.50	2.00	2.50	2.10	1.90	2.00	1.80	1.90	1.90	1.60	1.50	1.60
Aver.	*1.50*	*1.15*	*1.31*	*2.55*	*3.67*	*2.99*	*2.53*	*2.95*	*1.94*	*1.71*	*2.43*	*2.19*	*1.99*	*1.95*	*1.83*	*1.87*	*1.92*	*1.69*	*1.62*	*1.57*

No. 24 Hot-Rolled Annealed Sheets, at Pittsburgh, Cents a Pound

No. 24 gage was made the base in September, 1926; prices prior to that time are for No. 28 gage.

	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	2.31	1.87	1.80	2.60	4.50	5.00	4.70	4.48	4.35	3.00	3.35	3.83	3.60	3.35	2.91	2.80	2.85	2.65	2.35	2.22
Feb.	2.35	1.95	1.80	2.60	4.69	5.00	4.70	5.00	4.21	3.00	3.46	3.85	3.50	3.27	2.80	2.90	2.85	2.61	2.35	2.15
March	2.35	1.95	1.80	2.71	4.94	5.00	4.61	5.50	3.88	3.00	3.71	3.78	3.44	3.25	2.75	2.89	2.85	2.65	2.31	2.19
April	2.35	1.91	1.80	2.85	5.75	5.00	4.35	5.50	3.88	3.11	4.00	3.71	3.35	3.25	2.74	2.77	2.85	2.55	2.25	2.20
May	2.30	1.85	1.79	2.89	7.00	5.00	4.35	5.50	4.00	3.15	3.88	3.60	3.20	3.17	2.86	2.71	2.85	2.55	2.15	2.20
June	2.27	1.81	1.75	2.90	7.88	5.00	4.35	5.50	3.80	3.15	3.85	3.53	3.15	3.10	3.00	2.65	2.85	2.55	2.20	2.20
July	2.25	1.80	1.75	2.90	8.50	5.00	4.35	6.75	3.31	3.15	3.81	3.46	3.13	3.10	3.00	2.62	2.85	2.49	2.40	2.20
Aug.	2.21	1.86	1.85	2.90	8.50	5.00	4.35	7.50	2.90	3.23	3.75	3.45	3.15	3.10	3.00	2.65	2.85	2.44	2.40	2.16
Sept.	2.14	1.95	1.90	2.93	8.50	5.00	4.35	7.38	2.81	3.35	3.75	3.50	3.14	*2.90	3.00	2.65	2.85	2.42	2.40	2.10
Oct.	2.04	1.94	2.03	3.23	...	5.05	4.35	6.69	3.00	3.47	3.75	3.50	3.11	2.97	2.90	2.75	2.77	2.36	2.40	2.17
Nov.	1.97	1.87	2.25	3.65	5.00	5.00	4.35	5.77	2.86	3.35	3.75	3.50	3.25	3.00	2.78	2.75	2.75	2.35	2.40	2.10
Dec.	1.89	1.82	2.50	4.31	5.00	4.85	4.35	4.35	3.00	3.35	3.75	3.54	3.33	3.00	2.77	2.83	2.75	2.35	2.35	2.10
Aver.	*2.20*	*1.88*	*1.92*	*3.04*	*6.39*	*4.99*	*4.43*	*5.83*	*3.50*	*3.19*	*3.73*	*3.60*	*3.28*	*2.95*	*2.88*	*2.75*	*2.83*	*2.50*	*2.33*	*2.17*

*Base gage changed to No. 24.

Automobile Body Sheets, Base No. 20 Gage, f.o.b. Pittsburgh, Cents a Pound

	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	3.55	2.25	2.52	3.00	2.70	2.50	2.25	2.10	2.10	2.10	1.90	1.75
Feb.	3.29	2.25	2.64	3.00	2.70	2.50	2.20	2.10	2.10	2.10	1.90	1.75
March	3.04	2.25	2.95	2.93	2.69	2.50	2.20	2.10	2.10	2.10	1.90	1.71
April	3.05	2.36	3.25	2.86	2.53	2.43	2.18	2.08	2.10	2.06	1.85	1.70
May	3.10	2.40	3.20	2.80	2.40	2.40	2.22	2.00	2.13	2.00	1.85	1.70
June	2.88	2.40	3.00	2.76	2.31	2.32	2.25	2.00	2.20	2.00	1.85	1.70
July	2.55	2.40	3.00	2.68	2.30	2.30	2.25	2.00	2.14	2.00	1.85	1.70
Aug.	2.31	2.44	3.00	2.63	2.30	2.30	2.25	2.00	2.10	1.93	1.85	1.70
Sept.	2.23	2.44	3.00	2.69	2.25	2.30	2.25	2.00	2.10	1.90	1.85	1.70
Oct.	4.55	4.85	5.35	4.60	4.29	4.25	4.15	4.00	4.00	3.45	3.10	2.65
Nov.	4.35	4.85	5.35	4.60	4.40	4.25	4.12	4.00	4.00	3.38	3.10	2.55
Dec.	4.35	4.70	5.35	4.75	4.50	4.25	4.00	4.08	3.98	3.30	3.02	*
Aver.	*4.83*	*4.58*	*5.19*	*5.00*	*4.39*	*4.30*	*4.17*	*4.03*	*4.06*	*3.64*	*3.13*	...

*Automobile body sheets now quoted on cold-rolled sheet base.

Hot-Rolled Annealed Sheets, or Light Plates, No. 10 Gage, Cents a Pound at Pittsburgh

	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	5.20	4.35	4.70	5.35	4.75	4.50	4.18	4.00	4.10	3.90	3.30	2.90
Feb.	5.20	4.35	4.78	5.35	4.68	4.43	4.15	4.08	4.10	3.90	3.90	2.80
March	5.20	4.35	5.00	5.35	4.46	4.40	4.15	4.15	4.10	3.88	3.24	2.86
April	5.20	4.40	5.00	5.25	4.40	4.33	4.15	4.04	4.10	3.80	3.10	2.90
May	5.20	4.45	5.35	5.10	4.40	4.29	4.15	4.00	4.10	3.75	3.03	2.89
June	4.95	4.50	5.35	5.10	4.22	4.20	4.25	4.00	4.10	3.65	3.02	2.85
July	4.70	4.60	5.35	5.06	4.15	4.20	4.25	4.00	4.10	3.60	3.10	2.85
Aug.	4.65	4.75	5.35	4.75	4.25	4.20	4.25	4.00	4.08	3.60	3.10	2.81
Sept.	4.45	4.85	5.35	4.72	4.25	4.25	4.25	4.00	4.00	3.50	3.10	2.75
Oct.	2.25	2.60	3.00	2.70	2.26	2.30	2.14	2.00	2.10	1.90	1.85	1.70
Nov.	2.25	2.55	3.00	2.70	2.40	2.30	2.10	2.00	2.10	1.90	1.85	1.70
Dec.	2.25	2.50	3.00	2.70	2.50	2.30	2.10	2.08	2.18	1.90	1.80	1.70
Aver.	*2.73*	*2.41*	*2.96*	*2.79*	*2.45*	*2.37*	*2.20*	*2.04*	*2.12*	*1.99*	*1.86*	*1.71*

Standard Steel Pipe, Net Ton

Computed from list discounts, for carload lots; price for base size pipe, 1 to 3 in. (Base sizes ¾ to 3 in. prior to April 13, 1931).

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$41.39	$64.84	$88.92	$83.36	$80.64	$77.30	$51.87	$61.13	$70.30	$70.30	$70.30	$70.30	$68.60	$70.30	$70.30	$66.50	$64.84
Feb.	43.63	66.95	88.92	83.36	83.36	76.88	51.87	66.50	70.30	70.30	70.30	70.30	68.60	70.30	70.30	66.50	64.84
March	47.51	72.07	88.92	81.06	83.36	76.88	51.87	66.50	70.30	70.30	70.30	70.30	68.60	70.30	70.30	66.50	64.84
April	51.25	81.51	88.92	76.88	83.36	71.63	51.87	68.02	70.30	70.30	70.30	70.30	69.88	70.30	66.50	66.50	64.84
May	53.72	92.62	88.92	76.88	83.36	67.62	51.87	70.30	70.30	70.30	70.30	70.30	70.30	70.30	66.50	63.59	64.84
June	53.72	95.21	88.92	76.88	83.36	67.62	51.87	70.30	70.30	70.30	70.30	70.30	70.30	70.30	66.50	64.84	64.84
July	53.72	105.59	88.92	76.88	83.36	64.63	51.87	70.30	70.30	70.30	70.30	70.30	70.30	70.30	66.50	64.84	64.84
Aug.	53.72	105.59	88.92	76.88	83.36	63.91	54.74	70.30	70.30	70.30	70.30	70.30	70.30	70.30	66.50	64.84	64.84
Sept.	55.21	105.59	88.92	76.88	83.36	60.21	57.43	70.30	70.30	70.30	70.30	70.30	70.30	70.30	66.50	64.84	65.00
Oct.	55.58	105.59	88.92	76.88	83.36	56.50	58.74	70.30	70.30	70.30	70.30	68.54	70.30	70.30	66.50	64.84	65.00
Nov.	56.57	91.70	88.92	76.88	83.36	56.50	61.13	70.30	70.30	70.30	70.30	66.79	70.30	70.30	66.50	64.84	65.00
Dec.	61.01	88.92	88.92	76.88	83.36	53.96	61.13	70.30	70.30	70.30	70.30	66.79	70.30	70.30	66.50	64.84	65.00
Aver.	*52.25*	*81.73*	*88.92*	*78.31*	*83.13*	*66.14*	*54.69*	*68.71*	*70.30*	*70.30*	*70.30*	*69.57*	*69.84*	*70.30*	*67.45*	*65.29*	*64.89*

Wrought Iron Pipe, Net Ton, to Jobbers

(Computed from list discounts for carload lots; on 1½ and 2 in. prior to October, 1932, and on 1½ in. since October, 1932.)

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$58.64	$83.36	$122.27	$116.71	$115.60	$135.06	$100.96	$122.56	$131.10	$131.10	$127.82	$127.82	$127.82	$118.56	$118.56	$118.56	$118.56
Feb.	62.16	85.48	122.27	116.71	119.49	136.16	100.96	127.82	131.10	131.10	127.82	127.82	127.82	118.56	118.56	118.56	116.71
March	66.03	90.65	122.27	114.41	119.49	136.16	100.96	127.82	131.10	127.82	127.82	127.82	127.82	118.56	118.56	118.56	114.85
April	69.78	101.89	122.27	110.22	119.49	125.66	100.96	129.02	131.10	127.82	127.82	127.82	127.82	118.56	118.56	118.56	114.85
May	72.25	113.00	122.27	110.22	119.49	117.63	100.96	131.10	131.10	127.82	127.82	127.82	127.82	118.56	118.56	118.56	114.85
June	72.25	114.85	122.27	110.22	119.49	117.63	100.96	131.10	131.10	127.82	127.82	127.82	127.82	118.56	118.56	118.56	114.85
July	72.25	122.27	122.27	110.22	119.49	111.65	100.96	131.10	131.10	127.82	127.82	127.82	127.82	118.56	118.56	118.56	114.85
Aug.	72.25	122.27	122.27	110.22	119.49	110.22	105.74	131.10	131.10	127.82	127.82	127.82	127.82	118.56	118.56	118.56	114.85
Sept.	73.73	122.27	122.27	110.22	119.49	105.59	116.33	131.10	131.10	127.82	127.82	127.82	127.82	118.56	118.56	118.56	114.64
Oct.	74.10	122.27	122.27	110.22	119.49	100.96	120.41	131.10	131.10	127.82	127.82	127.82	127.82	118.56	118.56	118.56	114.00
Nov.	75.07	122.27	122.27	110.22	119.49	100.96	120.41	131.10	131.10	127.82	127.82	127.82	127.82	118.56	118.56	118.56	114.00
Dec.	79.50	122.27	122.27	110.22	119.49	100.96	120.41	131.10	131.10	127.82	127.82	127.82	127.82	118.56	118.56	118.56	114.00
Aver.	*70.67*	*110.24*	*122.27*	*111.65*	*119.16*	*116.55*	*107.50*	*129.67*	*131.10*	*128.37*	*127.82*	*127.82*	*127.82*	*118.56*	*118.56*	*118.56*	*115.08*

Cast Iron Pipe Prices, 1915 to 1932

At New York, 6-in., Net Ton

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$29.00	$41.50	$55.35	$65.70	$66.30	$63.30	$47.30	$54.90	$61.60	$54.60	$50.60	$48.60	$37.25	$39.60	$36.10	$37.90	$30.20
Feb.	29.33	41.50	55.35	62.70	70.30	63.30	47.30	56.50	61.60	54.60	50.60	48.60	37.25	39.35	38.60	37.90	29.70
March	29.75	43.10	55.35	62.70	71.30	63.30	47.68	57.75	61.60	53.00	50.60	47.20	37.25	38.60	38.75	37.90	28.40
April	30.50	50.88	55.35	57.70	73.90	63.30	48.80	58.50	61.60	52.60	50.60	47.35	36.25	37.40	39.50	35.40	28.20
May	30.50	55.50	56.60	54.45	76.30	62.05	49.60	58.50	61.60	50.85	50.60	45.80	37.60	35.85	39.90	34.15	28.20
June	30.50	60.75	61.44	52.03	76.30	54.30	50.80	61.35	61.60	50.60	50.60	44.42	37.60	35.10	39.90	33.70	28.20
July	30.50	65.50	61.75	50.46	76.30	52.30	53.50	62.30	60.60	50.60	50.60	42.75	37.60	33.20	39.30	32.90	28.73
Aug.	30.50	65.50	61.75	52.33	76.53	46.05	54.10	62.62	59.60	50.60	50.60	39.65	36.60	33.60	38.90	32.90	31.10
Sept.	30.83	65.50	61.75	54.30	77.22	46.30	54.50	63.60	56.60	50.60	49.85	37.25	35.60	33.60	38.90	32.90	31.30
Oct.	31.50	61.00	67.70	55.30	77.22	47.30	54.50	63.60	56.35	50.60	49.60	36.50	35.60	34.60	38.90	32.90	33.30
Nov.	35.50	56.50	67.70	58.30	77.22	47.30	54.50	63.60*	55.60	50.60	49.60	36.25	37.32	34.60	38.65	32.90	33.30
Dec.	41.00	56.50	67.70	61.30	68.87	47.30	54.75	63.60*	55.20	50.60	49.10	37.00	39.40	34.60	37.90	32.50	34.30
Aver.	*31.62*	*55.31*	*60.65*	*57.27*	*73.98*	*54.68*	*51.44*	*60.57*	*59.46*	*51.65*	*50.25*	*42.61*	*37.11*	*35.84*	*38.78*	*34.50*	*30.41*

*Concession of $2 to $3 a ton from this price to consumers willing to accept winter delivery.

Cast Iron Pipe, Delivered Chicago, 6-in. and Larger, Net Ton

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$29.00	$41.50	$54.30	$64.30	$67.55	$64.10	$42.50	$51.80	$56.20	$48.70	$49.20	$44.32	$35.00	$43.33	$42.20	$43.00	$40.40
Feb.	29.50	41.75	54.30	61.80	71.30	64.10	41.60	53.20	56.20	49.95	49.20	43.70	35.83	44.45	44.95	44.00	40.40
March	29.50	43.00	54.30	60.55	72.80	64.10	42.10	54.20	56.20	47.60	49.20	44.20	35.70	44.70	45.20	43.20	38.00
April	30.50	53.00	54.30	56.80	74.80	64.10	42.85	57.20	56.20	46.70	49.20	43.95	36.20	44.20	45.20	43.00	36.40
May	30.50	55.50	55.81	54.30	76.80	60.10	44.60	60.20	55.20	47.07	49.20	43.20	37.80	44.20	45.15	43.00	36.40
June	30.50	60.75	60.83	51.80	76.80	48.85	45.47	60.20	54.70	48.20	48.90	42.70	40.20	45.20	45.00	42.20	36.40
July	30.50	65.50	62.05	52.60	76.80	52.85	46.10	60.20	54.80	47.70	47.95	41.58	40.80	45.20	45.00	42.00	34.40
Aug.	30.50	65.50	61.80	55.30	78.18	43.20	46.40	60.20	53.45	49.20	48.30	37.40	42.20	45.20	44.75	42.00	35.20
Sept.	31.00	65.50	61.80	55.80	82.10	42.60	47.45	59.95	51.80	49.20	47.58	34.58	42.20	45.20	43.60	42.00	38.40
Oct.	31.50	53.50	66.80	59.00	83.10	42.60	51.20	57.40	49.70	49.20	47.20	34.20	43.00	43.70	44.00	41.60	38.40
Nov.	36.25	54.25	66.80	59.80	83.10	42.90	51.20	55.45	48.20	50.20	46.70	34.50	45.20	43.70	44.00	40.50	38.40
Dec.	41.00	55.21	66.80	64.40	83.60	43.10	51.20	55.20	47.60	50.20	46.70	35.08	43.10	43.70	43.60	40.20	38.40
Aver.	*31.69*	*54.58*	*59.99*	*58.04*	*76.00*	*52.72*	*46.06*	*57.10*	*53.35*	*48.66*	*48.32*	*39.95*	*39.77*	*44.39*	*44.59*	*42.23*	*37.60*

Hot-Rolled and Cold-Rolled Strip Steel

Cents a Pound, at Pittsburgh, over 6-in.

Hot-Rolled Strip Steel

	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	...	4.50	3.30	3.45	3.30	2.00	2.75	3.00	2.25	2.30	2.34	2.01	1.80	1.80	1.55	1.41
Feb.	...	4.50	3.30	4.63	3.11	1.84	2.86	3.00	2.35	2.30	2.21	2.08	1.80	1.80	1.55	1.40
March	...	4.50	3.30	5.00	2.93	1.81	3.18	2.93	2.40	2.30	2.30	2.10	1.80	1.79	1.55	1.40
April	...	4.50	3.30	5.25	2.76	1.98	3.30	2.75	2.40	2.30	2.30	2.10	1.90	1.70	1.55	1.40
May	...	4.25	3.30	5.50	2.53	2.20	3.30	2.75	2.20	2.30	2.30	1.96	1.90	1.70	1.55	1.40
June	...	3.50	3.05	5.50	2.50	2.40	3.23	2.50	2.20	2.30	2.30	1.85	1.90	1.69	1.55	1.41
July	...	3.50	3.05	5.50	2.46	2.50	3.00	2.50	2.20	2.30	2.30	1.85	1.90	1.65	1.55	1.45
Aug.	...	3.50	3.31	5.50	2.23	2.60	3.00	2.35	2.20	2.30	2.30	1.85	1.90	1.65	1.55	1.45
Sept.	...	3.50	3.30	5.50	2.00	2.75	3.00	2.25	2.20	2.30	2.30	1.85	1.90	1.65	1.55	1.45
Oct.	...	3.50	3.30	5.25	2.00	2.90	3.00	2.25	2.23	2.30	2.19	1.85	1.90	1.60	1.54	1.45
Nov.	4.50	3.50	3.30	4.70	2.00	2.83	3.00	2.25	2.30	2.30	2.10	1.88	1.90	1.58	1.50	1.45
Dec.	4.50	3.50	3.30	3.65	2.00	2.75	2.88	2.25	2.30	2.30	2.03	1.80	1.90	1.55	1.49	1.45
Aver.	...	*3.90*	*3.26*	*4.95*	*2.49*	*2.38*	*3.04*	*2.57*	*2.27*	*2.30*	*2.26*	*1.93*	*1.88*	*1.68*	*1.54*	*1.43*

Cold-Rolled Strip Steel

	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	7.00	6.50	6.25	6.00	6.25	3.50	4.50	5.00	4.00	3.90	2.95	3.00	2.85	2.65	2.25	1.92
Feb.	7.25	6.50	6.25	7.00	6.06	3.50	4.69	4.75	4.00	3.90	2.80	3.00	2.85	2.65	2.25	1.90
March	7.63	6.50	6.10	7.00	5.83	3.50	5.00	4.75	4.00	3.90	2.92	3.00	2.80	2.60	2.25	1.96
April	7.31	6.50	5.65	7.75	5.54	3.61	5.25	4.75	4.00	3.79	3.00	3.00	2.75	2.55	2.23	2.00
May	7.60	6.50	5.65	8.50	4.98	3.71	5.25	4.50	3.94	3.75	3.00	3.00	2.75	2.50	2.15	2.00
June	8.63	6.50	5.65	8.50	4.88	4.00	5.19	4.50	3.53	3.72	3.19	3.00	2.75	2.45	2.15	2.00
July	9.00	6.50	5.65	8.50	4.25	4.00	5.00	4.30	3.63	3.60	3.25	2.92	2.75	2.45	2.15	2.00
Aug.	9.00	6.50	5.65	8.50	3.96	4.10	5.00	4.13	3.75	3.60	3.25	2.90	2.75	2.35	2.15	2.00
Sept.	9.00	6.50	5.65	8.50	3.78	4.25	5.00	4.00	3.75	3.50	3.25	2.72	2.75	2.35	2.15	1.92
Oct.	9.00	6.50	5.65	8.25	3.75	4.50	5.00	4.00	3.75	3.25	3.00	2.75	2.75	2.35	2.13	1.90
Nov.	6.75	6.50	5.65	8.00	3.75	4.50	4.98	4.00	3.90	3.25	3.00	2.85	2.76	2.33	2.05	2.00
Dec.	6.50	6.35	5.93	6.63	3.75	4.50	4.91	4.00	3.90	3.00	3.00	2.85	2.75	2.25	2.03	2.00
Aver.	*7.89*	*6.49*	*5.81*	*7.76*	*4.73*	*3.97*	*4.98*	*4.39*	*3.85*	*3.60*	*3.05*	*2.92*	*2.77*	*2.46*	*2.16*	*1.97*

Plain Wire, Base, at Pittsburgh, Cents a Pound

	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan. ..	1.55	1.35	1.34	1.98	2.95	3.25	3.25	3.25	3.25	2.25	2.45	2.75	2.60	2.50	2.49	2.40	2.50	2.40	2.20	2.20
Feb. ..	1.55	1.40	1.39	2.10	2.95	3.25	3.25	3.50	3.13	2.20	2.63	2.75	2.60	2.50	2.41	2.48	2.50	2.40	2.20	2.20
March..	1.56	1.40	1.40	2.25	3.11	3.25	3.19	3.50	3.00	2.25	2.65	2.75	2.60	2.50	2.40	2.50	2.50	2.40	2.20	2.20
April ..	1.60	1.40	1.37	2.25	3.23	3.25	3.00	3.50	3.00	2.25	2.68	2.75	2.50	2.50	2.40	2.50	2.50	2.38	2.20	2.20
May ..	1.60	1.36	1.35	2.45	3.45	3.25	3.00	3.50	3.00	2.25	2.75	2.68	2.50	2.50	2.40	2.50	2.50	2.30	2.20	2.20
June ..	1.60	1.30	1.35	2.45	3.70	3.25	3.00	3.50	2.75	2.25	2.75	2.65	2.49	2.50	2.40	2.50	2.50	2.30	2.20	2.20
July ..	1.58	1.32	1.39	2.45	3.95	3.25	3.00	3.50	2.56	2.25	2.75	2.63	2.50	2.50	2.40	2.42	2.50	2.30	2.20	2.20
Aug. ..	1.48	1.36	1.43	2.53	3.95	3.25	3.00	3.69	2.50	2.29	2.75	2.56	2.50	2.50	2.40	2.40	2.43	2.30	2.20	2.20
Sept. ..	1.47	1.40	1.54	2.55	3.95	3.25	3.00	3.75	2.58	2.39	2.75	2.53	2.50	2.50	2.40	2.40	2.40	2.30	2.20	2.20
Oct. ...	1.41	1.40	1.65	2.60	3.25	3.25	3.17	3.75	2.60	2.45	2.75	2.50	2.50	2.50	2.40	2.40	2.40	2.30	2.20	2.20
Nov. ..	1.39	1.39	1.72	2.80	3.25	3.25	3.29	3.65	2.56	2.45	2.75	2.50	2.50	2.50	2.40	2.40	2.40	2.30	2.20	2.20
Dec. ..	1.35	1.31	1.89	2.95	3.25	3.25	3.21	3.25	2.44	2.45	2.75	2.60	2.50	2.50	2.40	2.48	2.40	2.22	2.20	2.20
Aver.	*1.51*	*1.37*	*1.48*	*2.47*	*3.43*	*3.25*	*3.11*	*3.53*	*2.78*	*2.31*	*2.70*	*2.64*	*2.52*	*2.50*	*2.41*	*2.45*	*2.46*	*2.33*	*2.20*	*2.20*

Wire Nails at Pittsburgh, Keg of 100 Lb.

	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan. ..	$1.75	$1.54	$1.54	$2.13	$3.00	$3.50	$3.50	$4.50	$3.25	$2.50	$2.70	$3.00	$2.85	$2.65	$2.64	$2.54	$2.65	$2.33	$1.90	$1.95
Feb. ..	1.75	1.60	1.57	2.25	3.00	3.50	3.50	4.50	3.21	2.40	2.78	3.00	2.85	2.65	2.56	2.63	2.65	2.25	1.90	1.95
March..	1.76	1.60	1.60	2.40	3.20	3.50	3.44	4.00	3.02	2.40	2.83	3.00	2.85	2.65	2.55	2.65	2.65	2.25	1.90	1.95
April ..	1.80	1.60	1.56	2.40	3.28	3.50	3.25	4.00	3.13	2.40	2.93	3.00	2.80	2.65	2.55	2.65	2.65	2.16	1.90	1.95
May ..	1.80	1.56	1.55	2.50	3.50	3.50	3.25	4.00	3.05	2.40	3.00	2.93	2.75	2.65	2.50	2.55	2.65	2.15	1.85	1.95
June ..	1.80	1.50	1.55	2.50	3.75	3.50	3.25	4.00	3.00	2.40	3.00	2.90	2.68	2.65	2.50	2.55	2.65	2.13	1.80	1.95
July ..	1.70	1.52	1.60	2.50	4.00	3.50	3.25	4.00	2.81	2.40	3.00	2.88	2.65	2.65	2.53	2.55	2.64	2.05	1.80	1.95
Aug. ..	1.65	1.56	1.61	2.58	4.00	3.50	3.25	4.25	2.75	2.48	3.00	2.81	2.65	2.65	2.55	2.55	2.55	2.04	1.88	1.95
Sept. ..	1.65	1.60	1.69	2.60	4.00	3.50	3.25	4.25	2.86	2.63	3.00	2.78	2.65	2.65	2.55	2.55	2.50	2.00	1.90	1.95
Oct. ...	1.63	1.60	1.80	2.63	...	3.50	3.31	4.25	2.90	2.70	3.00	2.75	2.63	2.65	2.54	2.55	2.43	1.99	1.90	1.95
Nov. ..	1.59	1.50	1.87	2.85	3.50	3.50	3.50	4.05	2.84	2.70	3.00	2.75	2.65	2.65	2.50	2.55	2.40	1.93	1.90	1.95
Dec. ..	1.55	1.51	2.04	3.00	3.50	3.50	4.12	3.25	2.69	2.70	3.00	2.85	2.65	2.65	2.50	2.63	2.40	1.90	1.93	1.95
Aver.	*1.70*	*1.56*	*1.67*	*2.53*	*3.52*	*3.50*	*3.41*	*4.09*	*2.96*	*2.51*	*2.94*	*2.89*	*2.72*	*2.65*	*2.54*	*2.58*	*2.57*	*2.10*	*1.88*	*1.95*

Bessemer Steel Billets at Pittsburgh, Gross Ton

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan. ...	$32.00	$63.00	$47.50	$43.50	$48.00	$43.50	$28.00	$37.30	$40.00	$37.00	$35.00	$35.00	$33.00	$33.00	$34.00	$30.00	$27.75
Feb. ...	33.50	65.00	47.50	43.50	55.25	42.25	28.00	39.63	40.00	37.00	35.00	33.00	33.00	33.25	33.00	30.00	27.00
March ..	42.40	66.25	47.50	42.25	60.00	38.40	28.00	44.38	40.00	36.70	35.00	34.00	33.00	34.00	33.00	30.00	27.00
April ...	45.00	73.75	47.50	38.50	60.00	37.50	29.50	45.00	40.00	35.50	35.00	33.25	33.00	34.80	33.00	30.00	27.00
May ...	45.00	86.00	47.50	38.50	60.00	37.00	34.00	44.60	38.50	35.25	35.00	33.00	33.00	36.00	32.50	29.50	27.00
June ...	43.50	98.75	47.50	38.50	61.00	37.00	35.00	42.63	38.00	35.00	35.00	33.00	32.25	35.25	31.00	29.00	26.50
July ...	41.00	100.00	47.50	38.50	62.50	32.25	35.00	42.50	38.00	35.00	35.00	33.00	32.00	35.00	31.00	29.00	26.00
Aug. ...	44.20	86.00	47.50	38.50	61.00	29.60	36.10	42.50	37.75	35.00	35.00	33.00	32.00	35.00	31.00	29.00	26.00
Sept. ...	45.00	66.25	47.50	38.50	58.74	29.00	39.50	41.88	36.40	35.00	35.00	33.00	32.00	35.00	31.00	29.00	26.00
Oct.	46.25	49.38	47.50	38.50	55.00	29.00	40.00	40.00	35.75	34.25	35.00	33.00	32.80	35.00	31.00	29.00	26.00
Nov. ...	52.00	47.50	47.50	41.38	49.70	29.00	37.75	40.00	35.50	34.75	35.00	33.00	33.00	35.00	31.00	29.00	26.00
Dec. ...	57.50	47.50	45.50	46.00	43.50	29.00	36.50	40.00	36.00	35.00	35.00	33.00	33.00	34.60	30.60	28.80	26.00
Aver..	*43.95*	*70.78*	*47.33*	*40.51*	*56.22*	*34.46*	*33.95*	*41.70*	*37.99*	*35.23*	*35.00*	*33.27*	*32.67*	*34.66*	*31.84*	*29.36*	*26.51*

Open-Hearth Steel Billets at Pittsburgh, Gross Ton

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan. ...	$33.00	$63.00	$47.50	$43.50	$48.00	$43.50	$28.00	$37.50	$40.00	$38.00	$35.00	$35.00	$33.00	$33.00	$34.00	$30.00	$27.75
Feb. ...	34.75	65.00	47.50	43.50	55.25	41.00	28.00	39.63	40.00	38.00	35.00	33.00	33.00	33.25	33.00	30.00	27.00
March ..	42.60	66.25	47.50	42.25	60.00	38.50	28.00	44.39	40.00	36.70	35.00	34.00	33.00	34.00	33.00	30.00	27.00
April ...	45.00	73.75	47.50	38.50	60.00	37.50	29.50	45.00	40.00	35.50	35.00	33.25	33.00	34.80	33.00	30.00	27.00
May ...	43.40	86.00	47.50	38.50	60.00	37.00	34.00	45.00	38.50	35.25	35.00	33.00	33.00	36.00	32.50	29.50	27.00
June ...	41.50	98.75	47.50	38.50	61.00	37.00	35.00	42.63	38.00	35.00	35.00	33.00	32.25	35.25	31.00	29.00	26.50
July ...	42.75	100.00	47.50	38.50	65.00	32.25	35.00	42.50	38.00	35.00	35.00	33.00	32.00	35.00	31.00	29.00	26.00
Aug. ...	45.00	82.50	47.50	38.50	61.00	29.60	35.50	42.50	37.75	35.00	35.00	33.00	32.00	35.00	31.00	29.00	26.00
Sept. ...	45.00	66.25	47.50	38.50	58.75	29.00	39.50	41.88	36.40	35.00	35.00	33.00	32.00	35.00	31.00	29.00	26.00
Oct.	46.25	50.50	47.50	38.50	55.00	29.00	40.00	40.00	35.75	34.25	35.00	33.00	32.80	35.00	31.00	29.00	26.00
Nov. ...	52.00	47.50	47.50	41.39	49.70	29.00	37.75	40.00	35.50	34.75	35.00	33.00	33.00	35.00	31.00	29.00	26.00
Dec. ...	57.50	47.50	45.50	46.40	43.50	29.00	36.50	44.00	36.00	35.00	35.00	33.00	33.00	34.60	30.60	28.80	26.00
Aver..	*44.06*	*70.58*	*47.33*	*40.54*	*56.43*	*34.36*	*33.90*	*41.75*	*37.99*	*35.62*	*35.00*	*33.27*	*32.67*	*34.66*	*31.84*	*29.36*	*26.51*

Steel Rails at Mill, Open-Hearth, Gross Ton

The extra $2 a gross ton, which was for many years charged for open-hearth rails, was annulled with the rail price announced Oct. 22, 1921

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$30.00	$40.00	$57.00	$57.00	$47.00	$47.00	$40.00	$43.00	$43.00	$43.00	$43.00	$43.00	$43.00	$43.00	$43.00	$43.00	$43.00
Feb. ...	30.00	40.00	57.00	57.00	47.00	47.00	40.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00
March ..	30.00	40.00	57.00	54.50	49.50	47.00	40.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00
April ...	30.00	40.00	57.00	47.00	57.00	47.00	40.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00
May ...	35.00	40.00	57.00	47.00	57.00	47.00	40.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00
June ...	35.00	40.00	57.00	47.00	57.00	47.00	40.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00
July ...	35.00	40.00	57.00	47.00	57.00	47.00	40.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00
Aug. ...	35.00	40.00	57.00	47.00	57.00	47.00	40.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00
Sept. ...	35.00	40.00	57.00	47.00	57.00	47.00	40.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00
Oct. ...	35.00	....	57.00	47.00	57.00	45.25	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	42.25
Nov. ...	38.00	....	57.00	47.00	57.00	40.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	40.00
Dec. ...	40.00	....	57.00	47.00	53.00	40.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	40.00
Aver..	*34.00*	*40.00*	*57.00*	*49.29*	*54.38*	*45.69*	*40.75*	*43.00*	*43.00*	*43.00*	*43.00*	*43.00*	*43.00*	*43.00*	*43.00*	*43.00*	*42.44*

Wire Rods at Pittsburgh

No. 5 Bessemer wire rods, gross ton. Quotations for November and December, 1917, and all of 1918, are Government prices and apply also to open-hearth rods

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan. ...	$43.00	$75.00	$57.00	$57.00	$60.00	$57.00	$36.00	$47.00	$51.00	$48.00	$45.00	$45.00	$41.60	$42.00	$40.00	$35.00	$37.00
Feb. ...	48.00	77.50	57.00	57.00	63.75	54.50	35.75	49.38	51.00	48.00	45.00	43.00	43.00	42.00	39.75	35.00	37.00
March ..	54.80	81.00	57.00	55.75	70.00	52.00	36.00	50.00	51.00	48.00	45.00	43.00	44.00	42.00	38.00	35.00	37.00
April ...	60.00	85.00	57.00	52.00	70.00	49.00	38.00	50.25	51.00	47.00	45.00	42.25	44.00	42.00	38.00	35.00	37.00
May ...	60.00	86.00	57.00	52.00	72.50	48.00	38.00	51.00	48.75	46.00	45.00	42.00	44.00	42.00	36.00	35.00	37.00
June ...	53.75	92.50	57.00	52.00	75.00	48.00	38.50	51.00	48.00	45.60	45.00	42.00	42.00	42.00	36.00	35.00	37.00
July ...	53.75	96.25	57.00	52.00	75.00	43.00	40.00	51.00	48.00	45.00	45.00	42.25	42.00	42.00	36.00	35.00	37.00
Aug. ...	55.00	94.00	57.00	52.00	75.00	41.80	42.40	51.00	46.50	45.00	45.00	43.00	42.00	42.00	36.00	35.00	37.00
Sept. ...	55.00	88.75	57.00	52.00	75.00	39.50	46.25	51.00	46.00	45.00	45.00	43.00	42.00	42.00	36.00	35.00	37.00
Oct. ...	55.00	77.25	57.00	52.00	75.00	40.50	45.00	51.00	45.50	45.00	45.00	42.75	42.00	40.00	36.00	35.00	37.00
Nov. ...	63.00	57.00	57.00	54.50	66.40	40.00	45.00	51.00	45.00	45.00	45.00	41.00	42.00	40.00	36.00	35.00	37.00
Dec. ...	68.75	57.00	57.00	59.50	57.00	38.00	45.00	51.00	48.00	45.00	45.00	40.00	42.00	40.00	35.20	35.40	37.00
Aver..	*55.84*	*79.77*	*57.00*	*53.98*	*69.55*	*45.94*	*40.49*	*50.39*	*48.31*	*46.05*	*45.00*	*42.44*	*42.55*	*41.50*	*36.91*	*35.03*	*37.00*

Finished Iron and Steel, Chicago and Pittsburgh

Sheets, Bars and Beams at Chicago—Rivets and Cold-Finished Bars at Pittsburgh

No. 24 Gage Hot-Rolled Annealed Sheets at Chicago District Mills, Cents a Pound

	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	4.17	3.75	3.50	3.20	3.03	3.00	2.85	2.45	2.35
Feb.	4.19	3.75	3.50	2.98	3.05	3.00	2.80	2.45	2.25
March ..	4.14	3.75	3.50	3.00	3.05	3.10	2.80	2.41	2.29
April ...	4.03	3.65	3.48	3.00	3.01	3.10	2.70	2.35	2.30
May	3.99	3.48	3.40	3.12	2.87	3.10	2.70	2.35	2.30
June ...	3.99	3.32	3.31	3.15	2.83	3.10	2.70	2.35	2.30
July	3.84	3.35	3.30	3.15	2.80	3.10	2.69	2.50	2.30
Aug.	3.84	3.35	3.30	3.15	2.80	3.05	2.55	2.50	2.30
Sept. ...	3.93	3.35	*3.07	3.15	2.80	3.00	2.52	2.50	2.26
Oct.	3.65	3.31	3.18	3.05	2.86	3.00	2.53	2.50	2.28
Nov. ...	3.68	3.43	3.25	2.94	2.90	2.88	2.45	2.50	2.20
Dec. ...	3.75	3.50	3.25	2.90	2.93	2.80	2.45	2.45	2.20
Aver...	*3.93*	*3.50*	*3.34*	*3.07*	*2.91*	*3.02*	*2.65*	*2.44*	*2.28*

*No. 28 gage to September, 1926; subsequent quotations for No. 24 gage.

Galvanized Steel Sheets at Chicago District Mill, Cents a Pound

	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	5.34	4.90	4.75	4.03	3.88	3.75	3.60	3.00	2.90
Feb.	5.34	4.90	4.75	3.90	3.90	3.75	3.40	3.00	2.87
March ..	5.29	4.80	4.75	3.90	3.90	3.85	3.40	3.00	2.93
April ...	5.21	4.75	4.75	3.90	3.86	3.85	3.40	2.90	2.95
May	5.12	4.55	4.68	3.98	3.75	3.85	3.33	2.90	2.95
June ...	5.14	4.39	4.55	4.00	3.70	3.85	3.29	2.87	2.95
July	5.00	4.38	4.45	4.00	3.65	3.85	3.25	3.00	2.95
Aug.	4.94	4.39	4.45	4.00	3.65	3.70	3.18	3.00	2.91
Sept ...	5.00	4.40	*3.94	4.00	3.65	3.65	3.10	3.00	2.85
Oct.	4.75	4.41	4.04	3.95	3.65	3.65	3.10	3.00	2.95
Nov.	4.79	4.68	4.10	3.85	3.65	3.60	3.10	3.00	2.95
Dec.	4.90	4.75	4.10	3.70	3.68	3.50	3.04	2.96	2.95
Aver...	*5.07*	*4.62*	*4.44*	*3.93*	*3.74*	*3.74*	*3.27*	*2.97*	*2.93*

*No. 28 gage to September, 1926; subsequent quotations for No. 24 gage.

Hot-Rolled Annealed Sheets, No. 10 Gage, at Chicago District Mill, Cents a Pound

	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	3.34	2.85	2.65	2.56	2.24	2.25	2.30	2.00	1.85
Feb.	3.34	2.85	2.65	2.36	2.25	2.25	2.25	2.00	1.83
March ..	3.29	2.83	2.65	2.39	2.25	2.35	2.25	2.00	1.80
April ...	3.21	2.75	2.65	2.40	2.24	2.35	2.25	1.95	1.80
May	3.14	2.55	2.65	2.40	2.20	2.35	2.23	1.95	1.80
June ...	3.14	2.44	2.49	2.40	2.18	2.50	2.15	1.95	1.80
July	3.07	2.48	2.45	2.40	2.15	2.50	2.15	1.95	1.80
Aug.	3.04	2.45	2.45	2.40	2.15	2.35	2.10	1.95	1.80
Sept. ...	3.10	2.45	2.45	2.40	2.15	2.35	2.10	1.95	1.80
Oct.	2.85	2.45	2.53	2.38	2.15	2.35	2.10	1.95	1.80
Nov.	2.85	2.58	2.55	2.27	2.15	2.35	2.03	1.95	1.80
Dec.	2.85	2.65	2.55	2.15	2.18	2.30	2.00	1.90	1.80
Aver...	*3.10*	*2.61*	*2.56*	*2.38*	*2.19*	*2.35*	*2.16*	*1.96*	*1.81*

Rail Steel Bars at Chicago District Mill, Cents a Pound

	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	2.30	2.03	2.00	1.90	1.80	1.90	1.88	1.60	1.50
Feb.	2.30	2.10	2.00	1.90	1.80	1.95	1.80	1.60	1.50
March ..	2.30	2.10	2.00	1.90	1.80	1.95	1.85	1.60	1.50
April ...	2.30	2.10	2.00	1.90	1.83	1.95	1.81	1.60	1.50
May	2.20	2.10	1.98	1.90	1.85	1.95	1.80	1.60	1.50
June ...	2.15	2.02	1.96	1.90	1.86	1.95	1.75	1.60	1.50
July	2.10	2.00	1.98	1.90	1.85	1.95	1.75	1.60	1.50
Aug.	2.05	2.00	2.00	1.90	1.85	1.95	1.65	1.60	1.50
Sept. ...	2.00	2.00	2.00	1.90	1.85	1.95	1.65	1.60	1.50
Oct.	2.00	2.00	2.00	1.83	1.95	1.95	1.65	1.54	1.50
Nov.	2.00	2.00	1.96	1.80	1.95	1.94	1.64	1.50	1.50
Dec.	2.00	2.00	1.90	1.80	1.95	1.90	1.60	1.50	1.50
Aver...	*2.14*	*2.04*	*1.98*	*1.88*	*1.86*	*1.94*	*1.74*	*1.58*	*1.50*

Common Bar Iron at Chicago, Cents a Pound

	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	2.40	2.00	2.00	2.00	1.90	2.00	1.98	1.71	1.68
Feb.	2.40	2.03	2.00	2.00	1.93	2.00	1.95	1.73	1.70
March ..	2.40	2.10	2.00	2.00	2.00	2.04	1.95	1.70	1.70
April ...	2.35	2.10	2.00	2.00	2.00	2.05	1.92	1.74	1.70
May	2.28	2.08	2.00	2.00	2.00	2.05	1.90	1.70	1.66
June ...	2.23	2.01	2.00	2.00	2.00	2.05	1.90	1.70	1.65
July	2.20	1.96	2.00	2.00	2.00	2.05	1.90	1.70	1.65
Aug.	2.18	1.90	2.00	2.00	2.00	2.05	1.75	1.70	1.62
Sept. ...	2.14	1.90	2.00	1.98	2.00	2.05	1.74	1.70	1.60
Oct.	2.10	1.90	2.00	1.88	2.00	2.04	1.70	1.70	1.60
Nov.	2.08	1.94	2.00	1.88	2.00	2.00	1.70	1.70	1.60
Dec.	2.01	2.00	2.00	1.90	2.00	2.00	1.70	1.60	1.60
Aver...	*2.23*	*1.99*	*2.00*	*1.97*	*1.99*	*2.03*	*1.84*	*1.70*	*1.65*

Soft Steel Bars at Chicago, Cents a Pound

	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	2.50	2.13	2.10	2.10	1.91	2.00	1.99	1.71	1.68
Feb.	2.50	2.20	2.10	2.03	1.95	2.01	1.95	1.72	1.65
March ..	2.50	2.20	2.10	2.00	1.98	2.05	1.95	1.70	1.68
April ...	2.38	2.15	2.10	2.00	2.00	2.05	1.91	1.75	1.70
May	2.30	2.10	2.10	2.00	2.00	2.05	1.85	1.70	1.70
June ...	2.25	2.10	2.10	2.00	2.00	2.05	1.83	1.70	1.70
July	2.19	2.10	2.10	2.00	2.00	2.05	1.75	1.70	1.70
Aug.	2.13	2.10	2.10	1.98	2.00	2.05	1.75	1.70	1.70
Sept. ...	2.02	2.10	2.10	1.90	2.00	2.05	1.71	1.70	1.70
Oct.	2.00	2.10	2.10	1.85	2.00	2.03	1.70	1.70	1.70
Nov.	2.05	2.10	2.10	1.87	2.00	2.00	1.70	1.70	1.70
Dec.	2.10	2.10	2.10	1.90	2.00	2.00	1.70	1.60	1.70
Aver...	*2.24*	*2.12*	*2.10*	*1.97*	*1.99*	*2.03*	*1.82*	*1.70*	*1.69*

Steel Beams at Chicago, Cents a Pound

	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	2.60	2.23	2.10	2.10	1.91	2.00	1.99	1.71	1.68
Feb.	2.60	2.30	2.10	2.03	1.95	2.01	1.95	1.72	1.65
March ..	2.60	2.30	2.10	2.00	1.98	2.05	1.94	1.70	1.68
April ...	2.50	2.25	2.10	2.00	2.00	2.05	1.90	1.75	1.70
May	2.45	2.20	2.10	2.00	2.00	2.05	1.83	1.70	1.70
June ...	2.39	2.18	2.00	2.00	2.00	2.05	1.79	1.70	1.70
July	2.27	2.10	2.10	2.00	2.00	2.05	1.75	1.70	1.70
Aug.	2.20	2.10	2.10	1.94	2.00	2.05	1.75	1.70	1.70
Sept. ...	2.06	2.10	2.10	1.90	2.00	2.05	1.71	1.70	1.70
Oct.	2.00	2.10	2.10	1.85	2.00	2.03	1.70	1.70	1.70
Nov.	2.15	2.10	2.10	1.87	2.00	2.00	1.70	1.70	1.70
Dec.	2.20	2.10	2.10	1.90	2.00	2.00	1.70	1.60	1.70
Aver...	*2.33*	*2.17*	*2.10*	*1.97*	*1.99*	*2.03*	*1.81*	*1.70*	*1.69*

Cold-Finished Steel Bars, Base, 100 Lb., f.o.b. Pittsburgh

	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$3.00	$2.80	$2.50	$2.30	$2.20	$2.20	$2.15	$2.08	$2.00
Feb.	2.95	2.80	2.50	2.30	2.20	2.20	2.10	2.10	2.00
March ..	2.98	2.72	2.50	2.38	2.20	2.20	2.10	2.10	2.00
April ...	3.00	2.70	2.50	2.40	2.20	2.30	2.10	2.10	2.00
May	2.90	2.70	2.50	2.40	2.20	2.30	2.10	2.10	1.82
June ...	2.90	2.60	2.50	2.33	2.20	2.30	2.10	2.10	1.70
July	2.84	2.60	2.50	2.20	2.10	2.30	2.10	2.10	1.70
Aug.	2.80	2.50	2.50	2.20	2.10	2.30	2.10	2.10	1.70
Sept. ...	2.74	2.46	2.50	2.15	2.10	2.30	2.10	2.10	1.70
Oct.	2.70	2.40	2.40	2.10	2.16	2.30	2.10	2.10	1.70
Nov.	2.70	2.48	2.30	2.10	2.20	2.30	2.00	2.10	1.70
Dec.	2.78	2.50	2.30	2.10	2.20	2.30	2.00	2.02	1.70
Aver...	*2.86*	*2.61*	*2.46*	*2.25*	*2.17*	*2.28*	*2.09*	*2.09*	*1.81*

Large Structural Rivets, Base, 100 Lb., f.o.b. Pittsburgh

	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$2.90	$2.60	$2.60	$2.34	$2.75	$2.90	$3.10	$2.75	$2.25
Feb.	2.75	2.60	2.53	2.30	2.75	2.90	3.10	2.75	2.25
March ..	2.75	2.60	2.50	2.30	2.90	2.90	3.10	2.75	2.25
April ...	2.65	2.58	2.50	2.75	2.90	3.06	3.10	2.75	2.25
May	2.65	2.45	2.50	2.75	2.90	3.10	2.95	2.75	2.25
June ...	2.61	2.40	2.50	2.75	2.90	3.10	2.90	2.75	2.25
July	2.60	2.40	2.50	2.75	2.90	3.10	2.90	2.75	2.25
Aug.	2.55	2.40	2.50	2.75	2.90	3.10	2.79	2.75	2.25
Sept. ...	2.60	2.40	2.48	2.75	2.90	3.10	2.75	2.55	2.25
Oct.	2.58	2.40	2.45	2.75	2.90	3.10	2.75	2.25	2.25
Nov.	2.60	2.60	2.45	3.00	2.90	3.10	2.75	2.25	2.25
Dec.	2.60	2.60	2.40	2.75	2.90	3.10	2.75	2.25	2.25
Aver...	*2.65*	*2.50*	*2.50*	*2.66*	*2.88*	*3.05*	*2.91*	*2.61*	*2.25*

No. 1 Heavy Melting Steel Scrap Composite Price

(Average of Pittsburgh, Chicago and Philadelphia Quotations, Gross Ton)

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$16.46	$21.73	$29.93	$17.77	$25.13	$14.04	$12.45	$20.22	$19.15	$20.10	$16.97	$15.17	$13.70	$17.02	$14.65	$11.30	$8.41
Feb.	16.10	21.35	29.92	14.75	26.00	15.21	12.46	21.46	19.21	18.27	15.50	14.58	13.71	16.96	14.92	11.15	8.27
March	17.28	23.60	29.58	14.52	25.50	13.17	13.46	24.79	17.56	16.92	15.83	14.65	13.65	16.71	14.88	11.10	8.23
April	17.42	26.63	28.47	15.79	24.42	11.63	14.71	24.00	15.20	15.48	15.27	14.71	13.81	17.18	14.30	10.83	8.12
May	16.47	27.63	28.79	15.06	23.71	12.20	15.67	20.77	14.71	15.46	14.35	13.95	13.90	16.54	13.71	9.94	7.48
June	15.25	37.21	28.87	16.54	23.47	11.47	15.52	18.94	14.88	16.09	14.40	13.60	13.52	16.39	13.31	9.39	6.89
July	15.19	36.00	29.00	19.13	24.21	11.00	15.92	17.23	16.00	16.46	15.42	13.48	13.13	16.60	13.08	9.25	6.46
Aug.	15.35	31.30	29.00	20.25	25.88	11.57	16.30	16.58	16.58	17.23	15.88	13.80	13.75	16.86	13.29	9.25	6.93
Sept.	15.67	31.50	29.00	18.87	26.53	12.15	18.33	16.98	17.20	17.42	16.25	13.92	14.75	16.60	13.70	9.12	7.69
Oct.	16.90	26.60	29.00	18.67	23.73	12.88	19.20	15.15	17.08	17.08	15.58	13.48	15.85	15.78	12.77	8.78	7.62
Nov.	20.40	27.83	28.50	20.50	20.00	12.73	18.02	15.13	18.17	17.63	15.25	13.18	15.97	14.15	11.28	8.61	7.45
Dec.	24.13	28.87	25.00	22.77	15.92	12.29	17.94	17.37	20.08	17.37	15.08	13.48	15.97	14.15	11.28	8.61	6.92
Aver.	*17.22*	*28.35*	*28.76*	*17.89*	*23.71*	*12.61*	*15.83*	*19.05*	*17.15*	*17.12*	*15.48*	*14.00*	*14.29*	*16.30*	*13.45*	*9.79*	*7.54*

Scrap Prices at Pittsburgh, Gross Ton

No. 1 Heavy Melting Steel

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$17.50	$22.60	$30.00	$19.00	$26.30	$15.50	$14.30	$21.80	$21.38	$21.50	$18.63	$16.88	$15.10	$19.31	$16.69	$13.19	$10.22
Feb.	17.06	21.75	30.00	14.75	27.75	16.00	14.00	23.25	20.88	19.50	17.50	16.13	14.94	18.63	16.81	12.88	10.25
March	18.45	23.25	30.00	14.00	27.25	14.00	15.13	25.38	19.38	18.50	17.55	16.55	14.81	18.44	16.56	12.80	10.25
April	17.81	28.00	28.50	15.20	26.00	12.63	16.38	25.88	16.20	17.00	16.63	16.50	15.31	18.60	15.95	12.39	10.12
May	16.95	28.80	28.50	14.75	25.00	13.30	17.30	22.80	15.63	16.75	15.69	15.40	15.25	17.88	15.25	11.25	9.60
June	15.88	41.00	28.62	17.12	25.00	12.69	17.00	21.13	16.00	17.30	15.75	14.81	14.56	18.25	15.13	10.30	8.75
July	16.31	39.00	29.00	19.70	26.00	12.00	17.38	18.10	17.50	18.00	16.81	15.00	14.10	18.55	14.75	10.56	8.25
Aug.	16.05	32.83	29.00	21.00	28.13	12.70	17.75	17.75	17.50	18.88	17.50	15.40	15.50	19.00	15.13	10.69	8.60
Sept.	16.19	33.25	29.00	19.20	29.00	13.63	20.13	17.88	18.10	18.70	17.88	15.50	16.56	18.31	15.60	10.65	9.54
Oct.	18.25	28.80	29.00	19.00	27.75	14.13	21.40	15.70	18.50	18.50	17.25	14.75	17.60	17.30	14.56	10.22	9.62
Nov.	21.20	29.50	28.87	22.25	23.50	14.30	20.50	16.13	19.63	19.50	17.20	14.25	17.19	16.39	13.19	10.22	9.15
Dec.	26.00	30.00	26.87	24.25	17.20	14.25	20.13	18.75	21.40	19.10	16.75	14.38	17.90	15.45	12.75	10.25	8.75
Aver.	*18.14*	*29.90*	*28.95*	*18.35*	*25.74*	*13.76*	*17.62*	*20.38*	*18.51*	*18.60*	*17.10*	*15.50*	*15.74*	*18.01*	*15.20*	*11.28*	*9.42*

Machine Shop Turnings

	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$17.50	$14.30	$12.00	$10.80	$11.50	$11.50	$6.00	$6.50
Feb.	15.88	13.63	11.38	10.88	11.50	11.39	6.44	6.50
March	14.20	13.35	12.00	10.25	10.63	10.94	7.65	6.75
April	13.39	12.00	12.63	10.44	11.15	10.90	7.06	6.56
May	12.25	11.00	11.30	10.20	11.06	10.19	6.57	6.00
June	13.05	11.00	10.50	9.00	11.63	9.56	6.50	5.12
July	13.63	11.38	11.50	9.10	11.90	8.60	6.75	4.75
Aug.	15.00	12.80	11.80	9.38	13.00	8.00	7.00	5.30
Sept.	14.75	13.06	11.63	11.13	12.06	8.00	7.30	6.00
Oct.	14.39	12.06	11.50	11.10	11.75	6.88	7.00	6.00
Nov.	15.00	11.90	11.10	11.00	11.00	6.00	6.94	6.00
Dec.	14.30	11.50	11.00	11.10	10.25	6.00	6.70	6.12
Aver.	*14.44*	*12.34*	*11.53*	*10.41*	*11.45*	*8.98*	*6.83*	*5.97*

Compressed Sheets

	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$20.00	$17.63	$15.50	$14.15	$18.81	$16.39	$12.50	$9.56
Feb.	18.00	16.13	15.06	14.06	18.31	16.19	12.56	9.56
March	17.35	15.60	15.45	14.56	18.25	15.75	12.55	9.70
April	15.63	15.25	15.56	14.94	18.55	15.60	11.94	9.50
May	15.46	14.75	14.40	14.90	17.81	15.06	10.88	8.95
June	16.30	14.60	13.75	14.25	18.13	14.81	9.75	8.12
July	16.63	15.50	14.31	13.60	18.25	14.65	10.06	7.50
Aug.	17.39	16.40	14.45	14.75	18.44	14.94	10.13	7.80
Sept.	17.40	16.50	14.50	16.39	18.19	14.95	10.35	9.25
Oct.	17.39	15.63	14.50	17.15	17.15	14.19	9.63	9.12
Nov.	18.00	16.00	13.70	17.00	16.13	12.81	9.75	8.65
Dec.	18.00	15.56	13.94	17.80	15.15	12.00	9.80	8.31
Aver.	*17.27*	*15.80*	*14.59*	*15.30*	*17.77*	*14.78*	*13.86*	*8.83*

Low-Phosphorus Scrap (Billet and Bloom Crops)

	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$26.50	$24.00	$21.00	$18.50	$22.00	$20.88	$17.25	$13.00
Feb.	24.75	22.25	20.25	18.50	22.00	21.25	18.00	13.00
March	23.30	22.00	20.30	18.50	22.50	21.50	18.00	13.00
April	22.13	21.13	21.00	18.50	23.45	21.40	17.50	13.00
May	21.63	20.00	20.00	18.60	22.50	19.88	15.00	12.40
June	22.00	20.00	19.25	19.00	22.25	19.13	14.10	10.87
July	22.00	20.75	19.00	19.00	22.45	19.20	14.50	10.50
Aug.	22.25	21.00	19.00	19.13	23.00	19.38	14.50	10.50
Sept.	23.00	21.67	20.00	19.88	22.39	20.00	14.30	10.50
Oct.	23.13	20.50	19.25	20.20	21.75	18.75	13.50	11.00
Nov.	24.00	20.60	18.30	20.50	21.13	17.13	13.00	11.50
Dec.	24.00	21.13	18.50	21.00	20.75	17.00	13.00	11.00
Aver.	*23.22*	*21.25*	*19.65*	*19.28*	*22.18*	*19.63*	*15.22*	*11.69*

Cast Iron Borings

	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$17.50	$14.88	$12.50	$11.30	$12.88	$11.25	$7.50	$6.50
Feb.	15.88	14.13	12.13	11.00	12.50	11.56	7.50	6.50
March	14.10	13.30	12.50	10.50	12.25	11.00	7.70	6.70
April	13.39	12.50	12.38	11.00	12.45	10.55	7.50	6.56
May	12.50	11.75	11.10	10.90	12.00	10.39	7.63	6.10
June	13.05	11.90	10.50	10.39	12.25	9.88	6.75	5.12
July	13.63	12.38	10.63	10.00	12.40	8.90	7.25	4.50
Aug.	15.00	12.75	11.00	10.75	12.75	8.50	7.56	5.30
Sept.	14.75	12.94	11.00	12.13	12.25	8.65	7.20	6.00
Oct.	14.39	12.50	11.00	12.50	12.25	8.00	7.25	6.00
Nov.	15.00	12.90	11.00	12.13	11.63	7.75	6.94	6.00
Dec.	14.90	12.13	11.13	12.00	10.75	7.40	6.70	5.50
Aver.	*14.51*	*12.84*	*11.57*	*11.22*	*12.20*	*9.49*	*7.29*	*5.89*

No. 1 Cast Cupola Scrap

	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$30.00	$24.20	$32.00	$25.00	$16.30	$23.30	$21.00	$19.63	$17.50	$16.00	$14.50	$16.00	$14.00	$12.00	$9.50
Feb.	30.00	18.75	34.00	22.75	16.00	24.75	21.38	20.13	17.00	15.56	14.50	15.00	14.00	12.00	9.50
March	30.00	18.00	34.00	21.20	15.94	26.75	20.25	18.60	17.00	15.80	14.50	15.13	14.00	12.00	9.20
April	29.00	19.00	33.00	18.00	16.88	27.75	18.50	17.75	16.50	16.00	14.50	15.39	14.00	12.00	9.00
May	28.50	17.20	32.00	18.00	18.50	26.30	17.88	17.50	16.50	15.70	14.50	15.50	14.00	10.75	8.90
June	28.62	18.50	32.00	16.63	18.75	24.13	17.25	17.10	15.90	15.13	14.25	15.50	14.00	10.00	8.50
July	29.00	20.40	40.20	16.00	19.00	21.10	17.80	17.00	15.75	15.00	14.25	15.50	13.00	10.00	8.87
Aug.	29.00	23.50	41.25	16.20	19.00	21.38	18.00	17.50	16.80	15.00	14.50	15.50	13.00	10.50	9.00
Sept.	29.00	23.50	42.00	16.38	22.13	21.75	18.00	17.40	16.50	15.00	14.94	15.50	13.00	10.10	9.50
Oct.	29.00	23.80	39.75	17.50	24.00	19.50	18.00	17.39	16.00	14.75	15.40	15.50	12.88	9.50	9.50
Nov.	29.00	27.25	34.25	17.10	23.13	18.63	18.13	18.00	16.30	14.35	15.00	15.13	12.13	9.50	9.10
Dec.	27.00	28.75	27.25	16.13	22.38	20.00	19.10	17.70	16.00	14.38	14.80	14.50	12.00	9.50	9.00
Aver.	*29.01*	*21.90*	*35.14*	*18.45*	*19.38*	*22.95*	*18.77*	*17.98*	*16.48*	*15.22*	*14.64*	*15.34*	*13.33*	*10.65*	*9.13*

No. 1 Railroad Cast Scrap at Cincinnati

(Net Ton)

	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$17.25	$17.38	$15.75	$14.00	$12.00	$13.73	$13.39	$10.80	$8.75
Feb.	17.75	15.88	15.00	13.00	12.00	13.67	13.39	10.80	8.75
March	16.25	15.50	14.50	13.00	11.60	13.62	13.39	10.80	8.75
April	14.00	15.13	14.10	13.00	11.60	13.62	13.39	10.50	8.75
May	13.00	15.00	13.50	13.00	11.43	13.62	13.28	10.35	8.50
June	13.38	15.90	13.63	13.00	11.39	13.62	12.95	10.35	7.50
July	14.50	16.00	14.50	13.00	11.39	13.62	12.95	10.35	7.25
Aug.	14.50	15.63	14.75	13.00	11.39	13.62	12.95	10.35	7.00
Sept.	15.30	15.50	15.00	13.00	11.60	13.62	11.52	8.80	7.50
Oct.	14.88	15.00	14.39	12.50	12.60	13.57	11.15	7.98	7.75
Nov.	15.63	15.88	14.00	12.25	13.17	13.39	11.15	7.81	7.75
Dec.	16.38	16.00	14.00	12.00	13.35	13.39	10.80	7.81	7.75
Aver.	*15.23*	*15.73*	*14.42*	*12.90*	*11.96*	*13.59*	*12.53*	*9.73*	*8.00*

No. 1 Machinery Cast Scrap at Cincinnati

(Net Ton)

	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$20.50	$20.12	$19.75	$17.00	$14.30	$17.14	$16.52	$12.60	$10.00
Feb.	21.50	19.12	19.39	16.00	14.30	17.24	16.52	12.60	10.00
March	20.00	18.35	19.00	16.00	13.35	17.19	16.52	12.60	10.00
April	18.00	17.75	17.80	16.00	13.35	17.19	16.52	11.90	10.00
May	16.75	17.75	17.00	15.60	13.65	17.19	15.85	11.25	10.00
June	17.13	18.15	17.00	15.50	13.60	17.19	15.63	11.25	8.50
July	18.25	18.25	17.00	15.50	13.55	17.19	15.63	11.25	8.00
Aug.	18.25	19.00	17.63	15.50	13.40	17.05	15.63	11.25	7.50
Sept.	18.13	19.25	18.00	15.50	14.20	16.96	13.48	9.45	8.00
Oct.	17.68	19.00	17.39	15.50	15.65	16.92	12.95	9.04	8.25
Nov.	18.40	20.12	17.00	14.50	16.70	16.57	12.95	8.93	8.25
Dec.	18.75	20.00	17.00	14.00	16.50	16.52	12.59	8.93	8.25
Aver.	*18.69*	*18.91*	*17.83*	*15.55*	*14.47*	*17.03*	*15.07*	*10.92*	*8.90*

Scrap Prices at Chicago, Gross Ton

No. 1 Heavy Melting Steel

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$15.50	$21.12	$30.00	$17.40	$24.50	$15.13	$11.45	$19.15	$17.69	$19.44	$15.12	$13.25	$12.50	$15.39	$12.75	$10.27	$7.50
Feb.	14.75	21.50	30.25	15.06	25.00	15.13	11.38	20.33	17.88	17.69	13.88	13.00	12.69	15.88	13.31	10.06	7.25
March	16.50	23.70	29.87	15.63	24.25	12.50	12.38	23.50	16.56	16.45	13.95	12.90	12.63	15.66	13.19	10.00	7.25
April	16.50	27.00	28.75	16.41	23.75	11.00	13.75	22.50	14.10	14.81	13.19	13.13	12.63	15.95	13.00	9.81	7.14
May	15.94	28.70	28.80	15.62	23.00	11.50	14.95	19.70	13.75	15.00	12.13	12.35	12.95	15.39	12.50	8.88	6.45
June	14.80	36.50	29.00	16.69	22.95	10.81	14.56	17.88	13.63	15.75	12.45	12.00	12.63	14.94	12.06	8.75	5.69
July	14.50	33.00	29.00	19.40	24.13	10.00	15.25	17.05	14.90	15.60	14.19	12.06	12.30	14.75	12.00	8.75	4.88
Aug.	15.25	29.60	29.00	20.88	25.35	10.60	15.95	16.00	15.50	16.44	14.00	12.30	12.75	15.06	12.13	8.38	5.75
Sept.	16.06	31.25	29.00	19.10	24.81	11.31	18.13	16.31	16.40	16.35	14.00	12.25	12.94	15.13	12.50	8.20	6.25
Oct.	16.81	26.00	29.00	18.25	21.50	12.44	18.40	14.15	16.13	16.00	13.00	11.69	13.95	14.30	11.38	8.00	6.00
Nov.	20.60	27.60	28.50	20.88	18.45	12.25	17.31	14.00	17.13	16.00	13.00	11.50	14.50	13.15	10.13	8.00	5.93
Dec.	23.00	28.37	22.75	21.80	16.20	11.13	17.25	16.06	18.95	15.75	13.00	12.06	14.55	12.50	10.00	7.80	5.25
Aver.	*16.68*	*27.86*	*28.66*	*18.09*	*22.82*	*11.98*	*15.06*	*18.05*	*16.05*	*16.27*	*13.49*	*12.39*	*13.09*	*14.84*	*12.08*	*8.91*	*6.28*

Old Steel Rerolling Rails

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$17.06	$27.00	$35.00	$22.10	$34.25	$15.63	$12.10	$20.40	$18.88	$21.75	$17.50	$16.38	$14.90	$17.00	$14.63	$12.50	$10.50
Feb.	17.06	27.00	35.00	16.44	34.38	15.50	12.00	21.75	20.13	19.25	16.63	15.94	15.00	17.50	15.00	12.00	10.50
March	17.65	28.00	34.75	16.38	32.30	13.30	13.31	24.63	19.13	17.86	16.50	15.60	14.44	17.50	15.00	12.00	9.85
April	18.00	32.62	33.50	17.55	32.13	12.63	14.50	23.75	16.30	16.00	16.13	16.00	13.81	17.50	15.00	11.75	9.00
May	17.38	36.50	34.00	17.75	31.75	13.40	15.70	21.70	15.00	16.88	15.19	15.20	14.40	17.50	14.81	10.69	8.30
June	15.85	46.90	34.00	18.75	32.65	12.94	15.25	19.25	14.81	17.85	15.45	14.75	14.81	17.50	14.63	8.40	7.31
July	15.25	45.19	34.00	25.15	35.00	12.25	16.13	18.00	15.50	17.44	17.19	14.88	14.75	17.50	14.50	10.39	6.63
Aug.	15.80	39.20	34.00	29.50	38.00	12.45	16.90	17.50	16.19	19.00	17.10	15.30	15.13	17.75	14.50	10.13	6.75
Sept.	17.06	39.75	34.00	26.80	38.13	13.13	19.38	17.38	17.30	19.25	17.39	15.19	15.88	17.81	14.40	10.00	7.19
Oct.	18.81	34.75	34.00	27.19	33.44	14.00	20.30	15.80	17.06	18.88	16.63	14.88	16.50	17.20	13.88	10.00	8.00
Nov.	24.50	34.80	33.50	31.25	22.90	13.80	18.38	15.06	18.19	19.44	16.50	14.50	16.63	15.50	12.50	10.25	8.00
Dec.	28.63	35.25	27.50	31.90	16.90	12.63	17.75	17.00	20.36	19.10	16.19	14.63	16.60	14.60	12.50	10.50	7.50
Aver.	*18.59*	*35.58*	*33.60*	*23.40*	*31.90*	*13.47*	*15.98*	*19.35*	*17.40*	*18.56*	*16.53*	*15.27*	*15.24*	*17.07*	*14.28*	*10.72*	*8.29*

Cast Iron Borings

	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$10.08	$18.48	$12.54	$16.11	$10.92	$6.38	$15.57	$13.58	$15.56	$13.39	$10.06	$10.40	$12.50	$9.56	$5.06	$3.38
Feb.	10.15	18.48	8.75	16.39	11.76	6.93	16.59	15.55	14.63	12.06	10.13	10.13	12.00	10.13	4.75	4.25
March	10.64	18.48	10.15	15.74	8.40	8.05	18.91	14.38	13.85	11.75	10.20	9.63	10.63	9.56	4.75	4.20
April	11.83	17.99	10.47	15.96	7.28	9.24	17.92	11.40	10.94	10.94	10.44	9.31	10.40	9.25	4.50	3.75
May	13.44	17.53	9.31	14.43	6.61	10.98	16.24	10.00	10.00	9.75	10.00	9.25	10.19	8.81	3.75	3.25
June	19.60	17.77	9.33	13.38	5.60	11.63	14.43	10.06	10.70	9.95	9.56	9.00	9.88	8.00	3.75	2.63
July	20.01	18.48	12.71	14.15	5.32	12.67	13.66	10.45	11.13	11.19	9.94	9.05	9.75	7.90	3.75	2.00
Aug.	18.36	18.48	14.28	15.06	5.38	12.88	12.04	10.69	12.75	11.45	10.50	9.31	10.19	7.75	3.94	3.05
Sept.	18.20	18.48	13.55	14.65	5.60	14.43	12.19	11.80	13.15	11.19	10.75	9.75	10.50	7.35	4.10	3.88
Oct.	15.75	18.48	11.63	12.88	6.44	14.90	10.42	11.56	12.75	8.88	10.13	10.75	10.00	5.75	4.00	3.88
Nov.	17.25	16.80	12.88	11.93	6.83	14.56	10.08	12.63	13.19	9.20	9.60	11.69	9.25	4.13	4.00	3.65
Dec.	18.05	14.84	14.17	10.98	6.09	14.56	12.04	14.36	13.50	9.50	10.19	11.85	9.15	4.90	3.60	3.06
Aver.	*15.28*	*17.94*	*11.65*	*14.30*	*7.19*	*11.43*	*14.17*	*12.21*	*12.68*	*10.77*	*10.13*	*10.01*	*10.37*	*7.76*	*4.16*	*3.41*

Steel Knuckles and Couplers

	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$25.20	$37.52	$24.51	$27.44	$16.39	$12.77	$24.98	$21.21	$22.88	$18.00	$16.25	$14.65	$16.50	$16.00	$12.00	$8.25
Feb.	25.20	36.89	19.32	29.68	16.11	12.39	26.53	21.77	21.00	17.13	16.00	14.50	17.00	16.00	12.00	8.25
March	26.60	35.00	19.60	27.66	13.55	14.12	28.71	20.00	18.70	16.70	15.60	14.06	17.00	15.88	11.80	7.95
April	30.67	34.00	19.21	26.32	12.47	15.68	27.93	17.40	17.63	16.44	15.69	13.81	17.30	15.25	10.56	7.63
May	33.71	34.00	17.36	25.48	13.66	16.69	25.42	17.00	17.63	15.39	14.80	14.50	17.13	14.31	9.75	6.70
June	43.83	34.00	18.20	25.20	13.16	15.89	22.55	16.63	19.00	15.30	14.25	14.25	16.75	13.75	9.75	5.63
July	45.92	34.00	20.50	27.16	11.63	17.92	21.00	17.20	18.19	17.39	14.25	13.75	16.75	13.50	9.75	5.50
Aug.	44.24	34.00	23.52	29.01	12.21	19.21	20.87	18.00	19.50	17.50	14.40	14.00	16.94	13.50	9.32	6.30
Sept.	40.88	34.00	21.95	27.72	13.03	21.34	21.56	19.35	19.50	17.39	14.00	14.75	17.00	13.50	9.00	7.00
Oct.	33.38	34.00	21.43	24.51	14.84	22.96	18.93	18.25	18.63	16.06	13.25	15.75	17.00	13.00	8.70	7.00
Nov.	33.04	34.00	23.39	20.83	14.28	21.84	17.64	19.63	18.75	15.50	13.00	16.00	16.39	12.13	8.50	7.00
Dec.	35.67	32.55	24.86	16.95	12.60	22.12	19.88	22.78	18.25	15.50	13.69	16.00	16.00	12.00	8.45	7.00
Aver.	*34.86*	*34.50*	*21.15*	*25.67*	*13.66*	*17.79*	*23.00*	*19.10*	*19.14*	*16.53*	*14.60*	*14.67*	*16.81*	*14.07*	*9.97*	*7.02*

Railroad Malleable Scrap

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$15.47	$19.88	$30.02	$19.71	$32.48	$16.52	$12.77	$25.26	$20.93	$21.13	$18.00	$16.06	$13.60	$18.69	$16.39	$12.75	$7.00
Feb.	14.93	19.39	30.02	16.65	33.53	17.36	12.81	26.75	21.77	20.00	17.56	16.06	13.50	19.39	17.13	11.94	7.00
March	15.62	20.10	31.24	18.07	31.92	15.46	13.87	28.56	21.00	19.10	17.60	16.00	12.63	19.39	16.88	11.70	6.65
April	15.56	22.81	31.64	17.70	30.95	13.59	15.68	28.00	19.30	17.50	17.39	15.88	12.75	19.35	16.55	11.13	6.38
May	15.05	26.10	32.82	17.08	29.68	14.11	16.80	25.54	18.13	17.63	16.50	14.45	13.00	18.56	15.75	10.25	6.00
June	13.14	35.41	33.04	17.92	28.73	12.88	16.73	24.08	16.88	18.00	16.60	13.50	12.69	17.81	13.94	9.55	5.19
July	13.03	33.73	33.28	20.94	30.24	12.53	17.51	22.51	17.00	17.88	17.81	13.63	12.50	16.85	13.50	9.00	4.63
Aug.	12.60	33.26	34.01	22.96	32.20	13.44	19.04	20.59	17.38	19.13	17.75	14.50	12.88	16.94	13.50	8.43	5.10
Sept.	12.88	34.44	34.01	21.22	30.95	14.63	23.67	21.71	18.20	19.10	17.39	13.69	14.39	17.00	13.50	7.50	6.75
Oct.	13.87	28.28	34.01	21.35	26.32	15.12	24.42	19.60	18.13	18.50	16.50	13.13	15.30	17.00	13.13	7.40	6.38
Nov.	17.92	28.67	32.68	25.89	21.78	14.67	23.11	18.91	19.00	19.19	16.50	12.55	15.88	16.39	12.69	7.25	5.50
Dec.	20.16	30.63	25.48	28.78	16.80	12.81	22.40	20.23	20.28	18.30	16.00	12.81	17.00	16.10	12.25	7.00	5.50
Aver.	*15.02*	*27.72*	*31.85*	*20.85*	*28.80*	*14.43*	*18.23*	*23.48*	*19.00*	*18.79*	*17.13*	*14.36*	*13.85*	*17.79*	*14.66*	*9.49*	*6.01*

Old Cast Iron Carwheels

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$14.63	$18.87	$30.00	$25.90	$36.13	$21.00	$15.30	$26.70	$20.50	$21.38	$18.00	$15.31	$13.90	$14.13	$13.81	$11.00	$8.19
Feb.	13.94	18.25	30.00	22.75	38.06	20.63	15.00	27.25	21.00	19.38	17.13	15.13	14.00	14.50	14.69	10.50	7.50
March	14.30	20.25	30.00	21.50	36.20	15.90	16.50	28.38	21.00	17.10	17.00	15.00	13.88	14.50	14.69	10.10	6.95
April	13.88	23.62	29.00	21.50	37.50	14.06	18.63	27.75	16.70	16.00	16.39	15.00	13.50	14.50	14.45	9.50	7.00
May	12.95	27.35	29.00	21.25	37.50	14.70	18.50	24.10	16.25	16.06	15.25	14.05	13.45	14.50	13.88	9.13	6.40
June	12.44	39.00	29.00	22.00	35.90	13.31	18.25	21.88	15.63	17.30	15.30	13.50	13.06	14.39	13.55	10.00	5.69
July	12.50	35.25	29.00	23.95	35.75	12.75	19.25	20.60	16.40	17.12	16.39	13.75	12.80	14.00	13.50	10.00	5.50
Aug.	11.60	30.40	29.00	26.25	38.35	12.95	20.60	19.50	17.13	17.50	15.90	14.50	12.75	14.00	13.50	9.75	6.30
Sept.	11.69	31.87	29.00	24.90	37.69	14.19	23.75	19.75	18.20	17.70	15.25	14.25	13.31	14.00	13.50	9.50	7.00
Oct.	12.94	25.75	29.00	24.88	36.06	16.50	25.10	17.90	17.63	17.38	14.50	13.56	13.85	14.00	13.13	9.30	7.00
Nov.	17.30	28.15	29.00	28.63	31.95	16.60	24.63	17.88	18.63	18.31	14.50	13.25	14.25	13.88	12.13	8.75	7.00
Dec.	21.25	31.00	26.75	31.10	24.40	15.75	24.00	19.75	20.70	18.30	14.50	13.44	14.10	13.60	11.75	8.50	7.00
Aver.	*14.12*	*27.48*	*29.06*	*24.55*	*35.46*	*15.70*	*19.96*	*22.62*	*18.31*	*17.79*	*15.84*	*14.23*	*13.57*	*14.17*	*13.55*	*9.67*	*6.79*

No. 1 Railroad Wrought, at Chicago, Net Ton

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$15.88	$23.50	$31.25	$19.10	$26.00	$13.63	$10.50	$17.75	$15.31	$17.44	$13.50	$12.50	$11.10	$13.63	$12.00	$8.50	$6.00
Feb.	14.94	23.75	31.25	15.13	27.00	13.50	10.44	18.38	15.38	16.13	12.88	12.31	11.13	14.25	12.19	8.00	5.50
March	16.20	25.90	30.75	15.88	27.10	11.60	11.50	20.88	14.06	14.60	12.95	12.10	11.00	14.00	12.25	8.10	5.50
April	17.00	30.35	30.20	16.05	27.25	10.00	12.13	20.00	12.75	13.00	12.44	12.39	11.25	14.15	11.95	8.19	5.44
May	16.50	32.60	29.75	15.69	26.38	10.40	12.90	17.60	12.00	13.44	10.94	11.35	11.60	14.13	11.13	7.50	4.15
June	15.20	41.00	29.75	16.87	25.25	9.63	12.69	15.50	11.56	14.65	11.60	11.00	11.31	13.63	10.25	7.20	3.75
July	14.94	37.75	29.75	18.60	24.88	9.25	13.63	14.60	12.80	14.19	13.31	11.39	10.85	13.50	9.90	7.00	3.75
Aug.	15.30	33.70	29.75	20.75	24.75	10.45	14.75	14.25	13.75	16.00	13.50	11.70	11.06	13.38	9.75	7.00	4.20
Sept.	16.38	35.50	29.75	19.50	23.88	11.50	17.62	15.63	14.80	15.50	13.50	11.25	11.81	14.00	9.75	6.95	5.13
Oct.	17.50	28.75	30.36	19.38	20.25	13.00	17.75	13.20	14.25	14.38	12.81	10.19	12.60	13.70	9.19	6.75	4.63
Nov.	21.00	30.90	28.68	22.88	16.85	12.20	15.81	12.50	15.50	15.63	12.50	9.60	13.13	12.44	8.63	6.50	4.50
Dec.	25.13	31.25	24.62	24.10	14.60	10.44	15.13	15.00	16.81	13.95	12.00	10.44	13.25	12.00	8.50	6.50	4.12
Aver.	*17.16*	*31.25*	*29.66*	*18.66*	*23.68*	*11.30*	*13.74*	*16.27*	*14.08*	*14.91*	*12.66*	*11.35*	*11.67*	*13.30*	*10.46*	*7.35*	*4.72*

No. 1 Machinery Cast Scrap, at Chicago, Net Ton

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$13.31	$15.50	$25.90	$22.95	$37.25	$17.25	$12.90	$21.60	$20.38	$19.88	$17.00	$16.50	$14.50	$15.81	$13.50	$9.50	$7.75
Feb.	12.81	15.37	26.06	20.00	38.88	18.00	13.25	23.63	21.00	18.75	17.00	16.50	14.50	16.25	13.75	9.50	7.50
March	13.45	16.90	27.25	21.63	37.85	14.90	14.13	26.25	20.13	18.20	17.00	16.50	14.50	16.00	13.75	9.50	7.20
April	12.88	20.43	27.12	21.45	37.25	13.25	14.88	25.75	18.40	17.25	16.39	16.50	14.13	16.00	13.50	9.39	7.00
May	12.56	23.20	26.70	20.12	37.38	13.60	16.20	23.30	17.38	16.88	15.88	15.80	14.00	15.39	12.88	9.00	6.50
June	11.75	30.00	27.12	20.75	36.30	12.75	16.06	21.75	16.75	17.50	16.15	14.50	13.88	14.75	12.50	9.00	6.13
July	11.50	29.25	28.06	23.30	36.50	12.25	17.00	19.60	16.90	17.50	17.19	14.50	13.50	14.50	12.00	9.00	6.00
Aug.	11.50	24.20	29.10	24.50	36.20	12.60	18.60	18.00	17.50	17.63	17.00	14.80	13.94	14.50	12.00	9.00	6.10
Sept.	12.13	23.75	30.00	24.20	34.00	13.44	21.38	19.63	18.20	17.90	16.88	14.56	14.81	14.50	11.40	8.50	6.25
Oct.	13.50	20.50	30.36	25.00	28.75	13.88	20.80	18.70	17.50	17.63	16.50	14.25	15.40	14.50	10.63	8.50	6.25
Nov.	15.55	22.00	28.87	28.12	23.00	13.50	20.25	18.38	17.88	18.19	16.00	13.50	15.50	13.63	9.36	8.50	6.25
Dec.	16.25	23.50	25.75	32.35	18.70	12.63	19.75	19.75	19.20	17.25	16.13	14.00	15.60	13.50	9.50	8.50	6.25
Aver.	*13.10*	*22.05*	*27.69*	*23.70*	*33.51*	*14.00*	*17.10*	*21.36*	*18.44*	*17.88*	*16.59*	*15.16*	*14.39*	*15.11*	*11.75*	*8.95*	*6.60*

Eastern Pennsylvania Scrap Prices, Gross Ton

No. 1 Heavy Melting Steel

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$16.38	$21.70	$30.00	$17.20	$24.75	$14.50	$11.60	$19.70	$18.20	$18.50	$17.00	$15.39	$13.50	$16.39	$14.50	$10.50	$7.00
Feb.	16.50	20.63	30.00	14.75	25.62	14.25	12.00	20.75	18.38	17.63	15.88	14.63	13.50	16.39	14.63	10.50	7.00
March	16.90	23.50	29.00	14.19	25.20	13.00	12.78	25.25	16.75	15.90	16.00	14.50	13.50	16.13	14.88	10.50	7.00
April	17.88	24.88	28.00	15.50	24.12	11.25	14.00	23.63	15.30	14.63	16.00	14.50	13.50	17.00	13.95	10.31	7.50
May	16.60	25.40	29.00	15.00	23.37	11.80	14.75	19.80	14.75	14.63	15.25	14.10	13.50	16.39	13.39	9.69	6.00
June	15.31	34.13	29.00	16.12	22.60	11.25	15.00	17.88	15.00	15.10	14.70	14.00	13.39	16.00	12.75	9.10	6.00
July	14.94	35.20	29.00	18.90	22.62	11.00	15.00	16.60	15.40	15.63	14.63	13.39	13.00	16.50	12.50	8.44	6.00
Aug.	14.75	31.88	29.00	19.37	25.00	11.40	15.20	16.00	16.75	16.38	16.20	13.70	13.00	16.50	12.63	8.69	6.30
Sept.	14.75	30.25	29.00	18.62	25.62	11.50	16.88	16.75	17.10	17.20	16.88	14.00	14.75	16.39	13.00	8.50	7.25
Oct.	15.63	25.00	29.00	19.10	22.75	12.06	17.80	15.40	16.63	16.75	16.50	14.00	16.00	15.70	12.38	8.13	7.25
Nov.	20.13	26.00	28.00	20.62	19.00	11.88	16.25	15.25	17.75	17.38	15.50	13.80	15.50	15.00	11.75	8.00	7.25
Dec.	23.75	28.20	25.00	22.50	15.25	11.50	16.38	16.75	20.10	17.50	15.50	13.50	15.40	14.50	11.10	7.75	6.75
Aver.	*16.96*	*27.23*	*28.67*	*17.66*	*22.99*	*12.12*	*14.80*	*18.65*	*16.84*	*16.44*	*15.84*	*14.13*	*14.05*	*16.07*	*13.12*	*9.18*	*6.77*

No. 1 Machinery Cast

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$17.00	$20.20	$30.00	$23.80	$36.00	$23.25	$16.50	$23.20	$20.70	$20.13	$18.39	$17.00	$16.00	$16.31	$15.00	$12.00	$10.00
Feb.	17.00	20.00	30.00	23.00	40.00	23.00	16.50	24.25	20.25	18.88	17.75	17.00	16.00	16.50	15.00	11.90	10.00
March	17.00	21.75	30.00	21.25	39.20	19.40	17.13	28.25	18.63	18.00	17.50	17.00	16.00	16.50	15.00	11.50	9.90
April	17.88	26.63	29.00	22.00	38.00	18.00	17.25	26.25	17.70	17.25	17.50	17.00	16.00	16.50	14.85	11.50	9.75
May	17.50	29.00	29.00	21.50	37.75	18.00	18.40	24.30	17.00	17.00	17.25	16.80	16.00	16.50	14.00	11.50	8.12
June	16.50	33.50	29.00	22.00	37.00	17.38	19.00	22.25	17.50	17.50	17.00	16.00	16.00	16.00	13.50	11.20	8.00
July	16.00	36.30	29.00	22.10	37.50	16.50	17.50	20.40	17.50	17.63	17.00	16.00	15.50	16.50	13.00	11.00	6.50
Aug.	16.00	33.25	29.00	24.75	39.00	17.00	18.60	20.38	17.88	18.00	17.70	16.00	15.50	16.50	13.00	11.00	8.20
Sept.	16.00	31.00	29.00	25.00	39.25	17.00	21.50	21.38	18.00	18.00	18.00	16.38	16.25	16.38	13.00	11.00	9.25
Oct.	16.15	28.00	29.00	25.20	38.75	17.13	22.60	19.50	17.50	18.00	17.39	16.50	17.10	16.00	13.00	11.00	9.50
Nov.	18.50	30.00	29.00	27.62	33.80	17.50	21.00	19.25	17.88	18.00	17.30	16.13	16.39	15.88	12.00	11.00	9.31
Dec.	20.75	30.60	29.00	30.75	24.50	16.63	20.25	20.25	19.50	18.13	17.00	16.00	16.25	15.00	12.00	10.10	8.00
Aver.	*17.19*	*28.35*	*29.25*	*24.08*	*36.73*	*18.49*	*18.85*	*22.47*	*18.34*	*18.04*	*17.48*	*16.48*	*16.08*	*16.28*	*13.61*	*11.23*	*8.88*

No. 1 Railroad Wrought

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$22.00	$26.60	$35.00	$24.20	$33.50	$20.00	$14.50	$22.10	$20.90	$20.88	$18.39	$17.00	$15.25	$15.50	$15.00	$13.13	$9.00
Feb.	21.63	25.50	35.00	21.50	36.00	19.75	14.63	24.75	21.50	20.13	17.75	17.00	15.06	16.00	15.00	12.00	8.50
March	22.13	30.75	35.00	20.25	35.90	17.20	15.38	27.50	19.00	18.90	17.20	17.00	14.60	16.00	15.00	12.00	8.50
April	23.38	36.00	35.00	21.60	35.00	17.00	15.88	27.00	18.10	17.75	17.50	16.50	14.50	16.00	15.00	11.25	9.00
May	22.50	41.40	34.00	21.00	33.50	15.20	16.90	24.20	16.63	17.50	17.25	16.50	14.50	16.00	15.00	11.00	7.19
June	20.50	51.25	34.00	21.50	33.00	14.38	17.00	22.50	16.50	18.10	16.60	16.00	13.75	16.00	15.00	10.20	7.00
July	19.50	50.60	34.00	24.40	33.00	13.50	17.13	18.80	17.70	17.63	16.50	15.75	13.50	16.00	15.00	10.00	7.00
Aug.	20.20	45.00	34.00	26.50	33.00	14.00	18.00	18.00	18.63	17.50	17.80	15.50	13.50	16.00	15.00	10.00	7.00
Sept.	20.00	44.00	34.00	26.50	33.25	15.00	20.88	18.50	19.00	17.70	17.88	15.50	14.50	16.00	15.00	10.00	7.50
Oct.	21.63	37.20	34.00	26.90	29.25	15.88	22.20	17.50	18.00	18.13	17.00	15.50	15.60	16.00	14.75	10.00	7.50
Nov.	24.13	35.00	34.00	28.37	25.00	16.00	19.00	17.38	18.38	18.50	17.00	15.30	16.00	15.88	13.75	10.00	7.50
Dec.	26.75	35.00	33.00	30.25	20.00	14.63	19.25	18.50	20.40	18.50	17.00	15.25	16.00	15.40	13.50	9.50	7.50
Aver.	*22.03*	*38.19*	*34.25*	*24.41*	*31.70*	*16.04*	*17.56*	*21.39*	*18.73*	*18.44*	*17.32*	*16.07*	*14.73*	*15.90*	*14.75*	*10.75*	*8.60*

Old Cast Iron Carwheels

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$16.38	$21.50	$30.00	$24.60	$36.00	$25.00	$16.50	$22.30	$20.10	$19.50	$18.13	$16.38	$15.50	$16.50	$15.00	$13.75	$10.75
Feb.	16.50	20.50	30.00	23.00	40.63	24.00	15.00	24.75	20.38	18.38	17.50	16.00	15.50	16.50	15.00	13.50	10.00
March	16.70	21.50	30.00	23.00	42.40	18.50	15.94	26.50	18.75	18.50	17.50	16.00	15.50	16.50	15.00	13.40	9.70
April	17.38	25.75	29.00	23.10	40.00	18.00	15.88	26.50	17.50	17.75	17.50	16.00	15.50	16.50	15.00	12.63	10.00
May	16.70	28.00	29.00	21.00	40.00	16.80	24.20	17.00	17.00	17.00	17.25	16.00	15.50	16.39	14.88	12.25	8.94
June	16.38	34.00	29.00	22.00	38.00	18.00	17.13	22.75	17.00	17.00	17.00	15.38	15.50	16.00	14.50	12.00	8.25
July	15.63	36.20	29.00	23.20	38.50	16.50	17.50	20.40	17.30	17.25	17.00	15.00	15.50	16.39	14.50	12.00	7.00
Aug.	15.50	34.50	29.00	24.50	40.60	16.40	18.10	20.25	17.75	18.50	17.40	15.30	15.50	16.50	14.63	12.00	8.40
Sept.	15.50	32.50	29.00	24.50	42.75	17.00	21.75	21.00	18.00	18.50	17.50	15.50	15.88	16.50	15.00	12.00	9.50
Oct.	15.88	29.00	29.00	24.50	40.50	17.00	22.50	19.60	17.50	18.50	17.13	15.50	16.50	16.50	15.00	12.00	9.75
Nov.	18.88	31.25	29.00	27.75	36.40	17.20	20.50	17.75	17.88	18.50	16.60	15.50	16.50	15.75	14.38	12.00	9.31
Dec.	22.38	32.40	28.00	30.50	26.00	16.63	20.00	19.50	19.20	18.50	16.50	15.50	16.50	15.50	14.00	11.50	8.50
Aver.	*16.98*	*28.93*	*29.17*	*24.30*	*38.48*	*18.42*	*18.13*	*22.18*	*18.20*	*18.16*	*17.22*	*15.67*	*15.78*	*16.29*	*14.74*	*12.42*	*9.17*

Metals, Tin Plate and Galvanized Sheets

Copper at New York, Cents a Pound (Lake Copper through 1919; Electrolytic Copper, 1920 to Date)

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	24.39	29.73	23.50	20.48	19.27	12.95	13.55	14.52	12.46	14.73	13.84	12.99	13.85	16.59	17.75	9.79	7.12
Feb.	26.85	34.90	23.50	17.86	19.02	12.84	12.92	15.34	12.73	14.49	14.00	12.69	13.82	17.74	17.75	9.71	6.97
March	27.10	35.85	23.50	15.46	18.50	12.19	12.68	16.84	13.52	14.06	13.86	13.08	13.90	21.25	17.75	9.88	5.76
April	28.27	31.67	23.50	15.55	19.19	12.49	12.61	16.81	13.21	13.30	13.69	12.81	14.13	19.69	15.67	9.48	5.54
May	28.88	31.42	23.50	16.18	19.05	12.79	13.13	15.54	12.76	13.34	13.60	12.65	14.19	17.75	12.76	8.67	5.25
June	27.82	32.46	23.50	17.95	19.00	12.88	13.62	14.74	12.35	13.41	13.64	12.37	14.50	17.75	12.09	8.05	5.11
July	25.84	28.78	25.80	22.07	19.00	12.46	13.71	14.39	12.39	13.95	13.91	12.51	14.50	17.75	11.02	7.67	5.04
Aug.	26.95	27.24	26.00	23.16	19.00	11.70	13.74	13.87	13.26	14.48	14.19	13.00	14.50	17.75	10.65	7.26	5.15
Sept.	28.03	24.90	26.00	22.68	18.70	12.01	13.75	13.36	12.97	14.42	14.05	12.93	14.70	17.75	10.39	6.98	5.95
Oct.	28.48	23.50	26.00	22.13	16.56	12.67	13.66	12.58	12.96	14.29	13.88	12.98	15.16	17.75	9.60	6.75	5.72
Nov.	32.32	23.50	26.00	20.69	14.63	13.07	13.62	12.76	13.59	14.36	13.59	13.34	15.75	17.75	10.17	6.54	5.97
Dec.	33.38	23.50	25.40	18.90	13.63	13.55	14.00	12.88	14.23	13.82	13.31	13.79	15.84	17.75	10.29	6.60	4.78
Aver.	*28.19*	*28.95*	*24.68*	*19.43*	*17.96*	*12.63*	*13.42*	*14.47*	*13.04*	*14.05*	*13.80*	*12.93*	*14.57*	*18.11*	*12.99*	*8.11*	*5.55*

Spelter (Zinc) at New York, Cents a Pound

	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	5.29	6.59	18.19	9.94	7.88	7.38	9.62	5.83	5.06	7.28	6.78	8.10	8.75	7.03	6.00	6.70	5.59	4.37	3.38
Feb.	5.40	8.84	20.13	10.48	7.99	6.70	9.14	5.36	4.85	7.58	7.11	7.86	8.16	7.04	5.90	6.70	4.53	4.36	3.19
March	5.28	9.29	18.40	10.77	7.64	6.52	8.93	5.20	5.00	8.19	6.85	7.68	7.69	7.06	5.98	6.80	5.30	4.30	3.16
April	5.18	11.22	18.58	9.85	7.01	6.51	8.63	5.24	5.25	7.65	6.49	7.35	7.36	6.69	6.11	7.04	5.19	4.06	3.10
May	5.06	16.14	15.86	9.46	7.32	6.46	8.08	5.28	5.45	6.99	6.13	7.30	7.16	6.43	6.37	6.98	4.98	3.66	2.90
June	5.09	22.18	12.75	9.62	8.01	6.93	7.92	4.95	5.69	6.40	6.14	7.35	7.47	6.57	6.50	7.00	4.79	3.75	3.16
July	5.02	20.58	9.83	8.95	8.69	7.90	8.18	4.77	6.12	6.43	6.25	7.60	7.76	6.58	6.55	7.10	4.66	4.25	2.92
Aug.	5.60	14.11	8.98	8.69	8.96	7.84	8.31	4.69	6.59	6.68	6.53	7.55	7.69	6.70	6.59	7.15	4.72	4.17	3.13
Sept.	5.50	14.16	8.22	8.34	9.60	7.57	7.82	4.74	6.91	6.81	6.54	8.12	7.76	6.56	6.60	7.15	4.62	4.09	3.68
Oct.	4.97	13.96	9.98	8.24	9.11	7.83	7.51	5.10	7.20	6.66	6.67	8.65	7.66	6.35	6.60	7.09	4.40	3.73	3.41
Nov.	5.12	17.15	11.90	7.95	8.70	8.14	6.84	5.18	7.48	6.70	7.14	9.04	7.56	6.09	6.62	6.63	4.63	3.55	3.46
Dec.	5.71	16.69	11.13	7.84	8.45	8.59	6.00	5.25	7.46	6.60	7.73	8.97	7.39	6.15	6.70	6.09	4.43	3.50	3.50
Aver.	*5.27*	*14.24*	*13.66*	*9.18*	*8.28*	*7.36*	*8.08*	*5.13*	*6.09*	*7.00*	*6.70*	*7.96*	*7.70*	*6.60*	*6.39*	*6.87*	*4.82*	*3.98*	*3.25*

Lead, at New York, Cents a Pound

	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	4.11	3.74	5.93	7.69	6.87	5.56	8.67	5.00	4.70	7.85	8.31	10.26	9.25	7.59	6.50	6.65	6.25	4.80	3.75
Feb.	4.06	3.82	6.23	9.13	7.04	5.05	8.88	4.54	4.70	8.14	9.01	9.38	9.08	7.40	6.34	6.85	6.24	4.55	3.72
March	3.97	4.04	7.43	9.47	7.24	5.23	9.21	4.08	4.71	8.47	9.23	8.90	8.46	7.57	6.00	7.41	5.66	4.53	3.15
April	3.82	4.20	7.73	9.43	6.95	5.03	8.95	4.33	5.13	8.19	8.19	8.01	7.91	7.10	6.10	7.19	5.58	4.42	3.00
May	3.90	4.25	7.45	11.00	6.88	5.05	8.55	4.99	5.51	7.39	7.27	8.08	7.75	6.60	6.13	7.00	5.51	3.82	3.00
June	3.90	5.89	6.87	11.68	7.55	5.34	8.48	4.56	5.73	7.14	7.08	8.35	8.08	6.42	6.30	7.00	5.41	3.92	2.99
July	3.90	5.59	6.34	10.72	8.04	5.65	8.67	4.40	5.75	6.28	7.15	8.33	8.60	6.33	6.22	6.80	5.25	4.40	2.73
Aug.	3.87	4.68	6.26	10.72	8.05	5.77	8.98	4.40	5.88	6.74	8.02	9.52	8.96	6.69	6.25	6.75	5.49	4.40	3.24
Sept.	3.86	4.62	6.88	8.84	8.05	6.12	8.11	4.60	6.20	7.06	8.09	9.60	8.80	6.30	6.45	6.88	5.50	4.40	3.47
Oct.	3.52	4.60	7.00	6.77	8.05	6.45	7.24	4.70	6.67	6.84	8.31	9.62	8.40	6.25	6.50	6.87	5.17	3.97	3.05
Nov.	3.68	5.16	7.13	6.44	8.05	6.76	6.33	4.70	7.20	6.87	8.96	9.84	8.00	6.27	6.39	6.29	5.10	3.94	3.04
Dec.	3.80	5.33	7.60	6.48	6.71	7.03	4.80	4.70	7.28	7.61	9.61	9.36	7.87	6.52	6.49	6.25	5.10	3.80	3.00
Aver.	*3.87*	*4.66*	*6.90*	*9.03*	*7.46*	*5.76*	*8.07*	*4.58*	*5.79*	*7.39*	*8.27*	*9.10*	*8.39*	*6.75*	*6.31*	*6.83*	*5.52*	*4.25*	*3.18*

Straits Tin, at New York, Cents a Pound

	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	41.76	44.10	85.13	71.50	62.74	35.94	32.03	39.16	48.70	58.26	62.20	66.43	55.56	49.21	38.84	26.03	21.80
Feb.	42.60	51.47	85.00	72.45	59.87	32.16	30.74	41.98	53.41	57.09	63.65	69.05	52.47	49.39	38.63	26.27	21.97
March	50.53	58.38	85.00	72.50	61.93	28.79	29.14	48.61	55.03	53.67	64.47	69.23	52.11	48.85	36.76	27.02	21.81
April	51.51	55.82	88.53	72.50	62.12	30.36	30.58	45.84	50.02	52.27	63.35	67.88	52.28	45.93	35.90	25.13	19.17
May	49.14	63.21	100.00	72.50	54.99	32.50	30.92	43.11	44.08	54.65	62.36	67.47	51.53	43.88	32.16	23.16	20.90
June	42.07	61.93	91.00	71.83	48.34	29.39	31.46	40.97	42.74	55.93	60.63	67.42	47.92	44.20	30.26	23.53	19.58
July	38.25	61.61	93.00	70.11	49.29	27.69	31.67	38.47	46.29	58.05	62.98	64.01	47.01	46.29	29.76	24.96	20.89
Aug.	38.88	62.53	91.33	62.20	47.60	26.35	32.36	39.33	41.89	58.12	65.17	64.41	47.97	46.60	30.00	25.73	22.98
Sept.	38.65	61.54	80.40	59.79	44.43	26.70	32.36	41.60	49.24	58.27	68.89	61.43	48.06	45.32	29.59	24.51	24.76
Oct.	41.10	62.24	78.82	54.82	40.47	27.70	34.61	41.80	50.60	62.24	70.36	58.49	48.99	42.25	26.76	22.72	23.91
Nov.	44.12	74.18	73.67	54.17	36.97	28.93	36.76	44.09	54.25	63.30	70.75	57.49	50.76	40.18	25.87	22.78	23.31
Dec.	42.55	84.74	71.51	53.80	34.04	32.41	37.48	47.16	56.03	62.94	68.68	58.54	50.23	39.87	25.01	21.28	22.70
Aver.	*43.43*	*61.90*	*85.28*	*65.68*	*50.23*	*29.91*	*32.51*	*42.68*	*50.19*	*57.90*	*64.29*	*64.32*	*50.39*	*45.16*	*31.63*	*24.43*	*21.98*

Tin Plate, at Pittsburgh, Dollars a Base Box

	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	$3.60	$3.32	$3.10	$3.75	$7.00	$7.75	$7.35	$7.00	$7.00	$4.75	$4.75	$5.50	$5.50	$5.50	$5.50	$5.25	$5.35	$5.25	$5.00	$4.75
Feb.	3.60	3.29	3.10	3.96	7.38	7.75	7.35	7.00	7.00	4.71	4.80	5.50	5.50	5.50	5.50	5.25	5.35	5.25	5.00	4.75
March	3.60	3.30	3.25	4.19	8.00	7.75	7.26	7.00	7.00	4.60	5.23	5.50	5.50	5.50	5.50	5.25	5.35	5.25	5.00	4.75
April	3.60	3.30	3.25	4.50	8.00	7.75	7.00	7.00	6.44	4.75	6.00	5.50	5.50	5.50	5.50	5.25	5.35	5.25	5.00	4.75
May	3.60	3.30	3.15	5.30	8.40	7.75	7.00	7.00	6.25	4.75	5.70	5.50	5.50	5.50	5.50	5.25	5.35	5.25	5.00	4.75
June	3.60	3.30	3.11	5.81	10.50	7.75	7.00	7.00	6.25	4.75	5.50	5.50	5.50	5.50	5.50	5.25	5.35	5.25	5.00	4.75
July	3.60	3.27	3.10	6.00	12.00	7.75	7.00	7.50	5.69	4.75	5.50	5.50	5.50	5.50	5.50	5.25	5.35	5.25	5.00	4.75
Aug.	3.55	3.41	3.10	5.95	11.40	7.75	7.00	9.00	5.25	4.75	5.50	5.50	5.50	5.50	5.50	5.25	5.35	5.25	5.00	4.75
Sept.	3.50	3.35	3.15	5.75	12.00	7.75	7.00	9.00	5.25	4.75	5.50	5.50	5.50	5.50	5.50	5.25	5.35	5.25	5.00	4.75
Oct.	3.50	3.24	3.15	5.81	...	7.75	7.00	8.33	5.13	4.75	5.50	5.50	5.50	5.50	5.50	5.25	5.35	5.00	4.75	4.76
Nov.	3.40	3.15	3.28	5.97	7.75	7.75	7.00	7.50	4.75	4.75	5.50	5.50	5.50	5.50	5.50	5.25	5.35	5.00	4.75	4.55
Dec.	3.40	3.13	3.52	6.63	7.75	7.55	7.00	7.00	4.73	4.75	5.50	5.50	5.50	5.50	5.25	5.25	5.35	5.00	4.75	4.25
Aver.	*3.55*	*3.28*	*3.19*	*5.30*	*9.11*	*7.73*	*7.08*	*7.53*	*5.90*	*4.73*	*5.42*	*5.50*	*5.50*	*5.50*	*5.48*	*5.25*	*5.35*	*5.19*	*4.94*	*4.69*

No. 24 Gage Galvanized Sheets, at Pittsburgh, Cents a Pound

	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	3.46	2.87	2.79	4.75	6.25	6.25	6.05	5.33	5.70	4.00	4.35	4.98	4.75	4.60	3.78	3.65	3.60	3.33	2.90	2.80
Feb.	3.50	2.95	3.16	4.75	6.38	6.25	6.05	6.50	5.56	4.00	4.54	5.00	4.75	4.53	3.71	3.65	3.60	3.30	2.90	2.75
March	3.50	2.95	3.40	4.75	6.69	6.25	5.96	7.00	5.05	4.00	4.93	4.93	4.62	4.50	3.65	3.65	3.60	3.30	2.90	2.85
April	3.50	2.91	3.29	5.00	7.00	6.25	5.70	7.00	4.88	4.11	5.25	4.88	4.45	4.50	3.63	3.65	3.60	3.30	2.84	2.85
May	3.42	2.80	3.50	4.94	8.20	6.25	5.70	7.00	5.00	4.15	5.20	4.80	4.29	4.43	3.72	3.58	3.60	3.23	2.80	2.85
June	3.38	2.75	4.28	4.69	9.50	6.25	5.70	7.00	4.88	4.15	5.00	4.76	4.21	4.28	3.85	3.50	3.60	3.19	2.74	2.85
July	3.33	2.75	4.40	4.38	10.00	6.25	5.70	8.25	4.31	4.15	5.00	4.56	4.19	4.24	3.85	3.46	3.60	3.13	2.90	2.85
Aug.	3.24	2.85	3.71	4.21	10.00	6.25	5.70	9.00	3.90	4.23	5.00	5.55	4.20	4.23	3.85	3.40	3.50	3.05	2.90	2.81
Sept.	3.16	2.95	3.56	4.18	9.75	6.25	5.70	8.88	3.81	4.35	5.00	4.60	4.20	*3.83	3.85	3.40	3.50	3.00	2.90	2.75
Oct.	3.08	2.95	3.50	4.41	...	6.25	5.70	8.18	4.00	4.50	5.00	4.60	4.23	3.85	3.76	3.50	3.50	2.99	2.90	2.85
Nov.	2.98	2.88	3.89	5.18	6.25	6.25	5.70	7.04	3.86	4.43	4.93	4.60	4.50	3.85	3.66	3.50	3.48	2.95	2.90	2.85
Dec.	2.90	2.78	4.75	6.00	6.25	6.15	5.70	5.70	4.00	4.35	4.89	4.72	4.60	3.85	3.63	3.58	3.40	2.92	2.86	2.85
Aver.	*3.29*	*2.87*	*3.69*	*4.77*	*7.84*	*6.24*	*5.78*	*7.24*	*4.58*	*4.20*	*4.92*	*4.75*	*4.42*	*3.89*	*3.75*	*3.54*	*3.55*	*2.14*	*2.87*	*2.83*

**No. 24 gage was made the base in September, 1926. Quotations prior to that time are for No. 28 gage, for which there is now an extra of 50c. per 100 lb.*

Production of Iron and Steel and of Commodities Made From Them

Steel Ingots Made in the United States

(THE IRON AGE *figures prior to June, 1917; American Iron and Steel Institute figures since then, with additions for electric and crucible steel*)

(*Thousands of Gross Tons*)

	Jan.	Feb.	March	April	May	June	Half Year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Second Half	Year
1899	801	718	822	796	874	862	4,873	856	932	917	950	980	951	*5,586	*10,459
1900	979	868	962	893	977	921	*5,600	798	775	685	712	698	727	4,395	9,995
1901	*1,009	968	*1,069	*1,085	*1,162	1,094	*6,388	1,136	1,159	1,079	*1,200	1,176	1,018	*6,768	*13,156
1902	*1,223	1,060	1,192	*1,256	*1,321	1,185	*7,237	1,189	1,211	1,209	1,268	1,174	1,268	*7,319	*14,556
1903	1,217	1,131	1,265	*1,322	*1,363	*1,376	*7,674	1,230	1,250	1,277	1,178	822	674	6,431	14,105
1904	759	1,020	1,239	1,325	1,263	1,100	6,706	885	1,001	1,153	1,196	1,262	1,327	6,824	13,530
1905	*1,516	1,389	*1,710	1,624	*1,735	1,576	*9,550	1,425	1,629	1,670	*1,746	*1,770	1,673	*9,913	*19,463
1906	*1,928	1,746	*2,018	1,848	1,956	1,833	*11,329	1,739	1,794	1,757	*2,047	2,029	1,929	11,295	*22,624
1907	2,005	1,830	1,949	2,007	*2,087	1,944	*11,822	1,975	2,046	1,899	*2,124	1,654	1,039	10,737	22,559
1908	934	954	1,057	1,023	1,004	972	5,944	1,049	1,171	1,263	1,401	1,350	1,499	7,733	13,677
1909	1,623	1,575	1,722	1,622	1,700	1,801	10,043	1,899	2,030	*2,225	*2,347	*2,376	*2,379	13,256	*23,299
1910	*2,404	2,257	*2,506	2,365	2,203	2,157	*13,892	1,904	2,016	1,956	1,929	1,818	1,639	11,262	*25,154
1911	1,716	1,788	2,199	2,001	1,918	1,801	11,423	1,682	1,951	1,992	2,050	2,015	1,916	11,606	23,029
1912	2,169	2,191	2,441	2,491	*2,648	2,461	*14,401	2,445	2,648	2,484	*2,833	2,759	2,715	*15,884	*30,285
1913	2,814	2,562	2,679	2,757	*2,841	2,532	*16,185	2,482	2,466	2,510	2,563	2,151	1,923	14,095	30,280
1914	1,907	1,881	2,287	2,285	2,039	1,930	12,329	1,907	1,944	1,895	1,799	1,470	1,476	10,491	22,820
1915	1,663	1,777	2,226	2,271	2,351	2,555	12,843	2,662	*2,887	*3,061	*3,246	*3,259	*3,326	*18,441	*31,284
1916	*3,333	3,321	*3,627	3,356	*3,652	3,473	*20,762	3,245	3,481	3,463	*3,672	3,581	3,198	20,640	*41,402
1917	*3,743	3,093	*3,864	3,792	*4,061	3,617	*22,170	3,447	3,663	3,486	3,932	3,714	3,207	21,449	*43,619
1918	2,641	2,725	3,728	3,791	3,939	3,696	20,520	3,732	3,696	3,832	4,017	3,668	3,586	*22,531	*43,051
1919	3,651	3,178	3,128	2,631	2,266	2,607	17,461	2,947	3,226	2,718	2,046	2,513	2,784	16,234	33,695
1920	3,524	3,402	3,917	3,132	3,423	3,539	20,937	3,328	3,562	3,561	3,581	3,133	2,779	19,944	40,881
1921	2,517	1,999	1,795	1,387	1,446	1,146	10,290	918	1,300	1,342	1,847	1,897	1,630	8,934	19,224
1922	1,893	2,071	2,814	2,902	3,219	3,128	16,027	2,953	2,629	2,818	3,410	3,430	3,301	18,541	34,568
1923	3,841	3,472	*4,067	3,964	*4,216	3,767	*23,327	3,531	3,696	3,357	3,577	3,134	2,863	20,159	43,486
1924	3,650	3,826	4,207	3,348	2,640	2,066	19,737	1,878	2,553	2,828	3,125	3,121	3,569	17,074	36,811
1925	4,193	3,752	4,194	3,584	3,455	3,205	22,383	3,084	3,421	3,490	3,889	3,903	3,971	21,758	*44,141
1926	4,132	3,785	*4,469	4,106	3,928	3,734	*24,154	3,635	3,987	3,913	4,074	3,706	3,467	22,782	*46,936
1927	3,823	3,845	*4,575	4,163	4,083	3,526	24,015	3,232	3,529	3,298	3,345	3,155	3,203	19,762	43,777
1928	4,028	4,081	4,549	4,345	4,246	3,778	*25,027	3,841	4,217	4,186	*4,693	4,306	4,055	*25,298	*50,325
1929	4,545	4,372	*5,118	4,999	*5,339	4,951	*29,324	4,898	4,988	4,573	4,579	3,556	2,932	25,526	*54,850
1930	3,808	4,067	4,288	4,142	4,014	3,445	23,764	2,945	3,085	2,863	2,714	2,230	1,995	15,831	39,595
1931	2,534	2,570	3,083	2,794	2,574	2,149	15,704	1,907	1,733	1,560	1,605	1,607	1,313	9,725	25,429
1932	1,459	1,458	1,409	1,238	1,106	897	7,568	792	832	975	1,069	1,015	†832	†5,515	†13,083

Asterisks denote high records. Figures for 1932 are preliminary and do not include electric and crucible ingots.
†Estimated, as to December.

Steel Ingots Made in the United States

(*Gross Tons a Day*)

	Jan.	Feb.	March	April	May	June	First Half	July	Aug.	Sept.	Oct.	Nov.	Dec.	Second Half	Year
1899	30,791	29,899	30,442	31,843	*32,376	*33,169	31,439	*34,246	*34,531	*35,254	*36,557	*37,680	*38,031	*36,039	*33,739
1900	36,244	36,173	35,648	35,732	36,180	35,422	35,899	31,929	28,719	27,394	26,384	26,831	29,071	28,356	32,139
1901	37,364	40,342	41,126	41,746	*43,051	*43,759	*41,213	43,702	42,939	43,174	*44,427	*45,235	40,699	*43,384	*42,303
1902	*45,284	44,164	*45,834	*48,321	*48,939	47,419	*46,693	45,735	46,569	46,497	46,974	46,961	48,760	*46,916	*46,805
1903	45,066	47,111	48,668	*50,857	*52,436	*52,906	*49,510	47,313	48,075	49,128	43,624	32,872	25,909	41,222	45,353
1904	29,186	40,817	45,863	50,973	48,567	42,309	42,985	35,416	37,057	44,339	45,985	48,542	51,064	43,744	43,364
1905	*58,298	57,860	*63,349	*64,980	64,248	60,624	*61,614	56,993	60,320	64,142	*67,174	*68,077	66,931	*63,954	*62,784
1906	*71,406	*72,758	*74,746	73,942	72,439	70,500	*72,626	69,491	66,501	70,295	*75,823	*78,023	77,151	*72,869	*72,747
1907	74,265	76,239	74,967	77,216	77,293	77,749	*76,272	75,950	75,774	75,971	*78,689	63,607	41,559	68,828	72,539
1908	34,617	38,153	40,675	39,342	38,605	37,375	38,105	40,342	45,034	48,561	51,903	53,997	57,654	49,568	43,839
1909	62,412	65,630	63,753	62,387	65,390	69,273	64,791	73,031	78,054	*85,576	*90,256	*91,398	*91,511	*84,976	*74,916
1910	*92,462	*94,024	92,804	90,097	84,720	82,977	*89,624	76,152	74,678	75,242	74,191	69,946	63,015	72,195	*80,881
1911	65,991	74,524	81,441	80,042	71,023	69,285	73,698	67,257	72,268	76,632	78,851	77,498	76,642	74,880	74,289
1912	80,320	87,650	93,879	*95,803	*98,066	*98,439	*92,310	94,057	98,060	*99,369	*104,927	*106,107	*108,610	*101,823	*97,066
1913	104,218	106,757	103,034	106,052	105,220	101,268	*104,419	95,468	94,839	96,543	94,927	86,051	73,954	90,362	*97,364
1914	70,630	78,348	87,972	87,887	78,410	74,239	79,539	73,350	74,759	72,889	66,626	58,786	56,794	67,251	73,376
1915	63,964	74,060	82,432	87,354	90,406	98,264	82,877	102,387	*111,023	*117,733	*124,839	*125,359	*127,946	*118,214	*100,592
1916	*128,195	*132,824	*134,334	134,239	*135,277	133,563	*133,089	129,780	128,943	133,184	*141,224	137,739	127,534	*133,162	*133,125
1917	138,629	128,891	*143,093	*151,665	150,400	139,129	*142,113	137,900	135,683	139,455	145,619	142,843	128,263	138,384	140,255
1918	97,822	113,539	143,370	145,815	145,910	147,814	132,322	143,520	136,875	*153,289	148,794	141,083	143,445	*144,430	138,425
1919	135,224	132,396	120,295	101,202	83,935	104,287	112,651	113,332	124,082	104,539	75,779	100,523	107,077	104,064	108,343
1920	130,519	141,739	145,073	120,480	131,661	136,114	134,213	127,992	137,016	136,976	137,726	120,496	106,874	127,846	131,030
1921	96,810	83,279	66,473	53,342	55,622	44,090	66,387	36,713	48,156	51,619	71,044	72,942	62,707	57,270	61,814
1922	72,764	86,324	104,247	116,090	119,215	120,299	103,401	118,112	97,380	108,395	131,164	131,935	132,017	119,621	111,511
1923	142,263	144,660	150,618	*158,549	156,161	144,894	*149,532	141,258	136,881	134,271	132,485	120,551	114,531	130,056	139,825
1924	135,182	153,050	*161,796	128,787	97,779	82,627	126,519	72,223	98,188	108,755	115,756	124,846	137,279	109,449	117,984
1925	155,307	156,348	161,321	137,834	132,883	123,248	144,407	118,634	131,577	134,214	144,030	156,116	152,728	139,472	*141,932
1926	158,931	157,710	*165,504	157,915	151,076	143,621	*155,831	139,807	153,347	150,515	156,713	142,529	133,339	146,039	*150,920
1927	147,039	160,222	*169,439	160,130	157,023	135,621	154,939	129,285	130,707	126,824	128,664	121,320	123,201	126,676	140,761
1928	154,913	163,231	168,475	*173,805	157,298	145,325	*160,429	153,629	156,192	167,447	*173,810	165,624	162,212	*163,209	*161,818
1929	168,323	*182,150	*196,861	192,273	*197,727	*198,062	*189,187	188,409	184,742	182,910	169,602	136,769	117,271	163,631	*176,368
1930	141,035	169,452	164,915	159,300	148,676	137,817	153,317	113,277	118,648	110,105	100,508	89,185	76,735	101,482	127,316
1931	93,852	107,083	118,577	107,462	99,346	82,654	101,162	73,346	66,654	60,000	59,444	59,518	50,500	61,577	81,369
1932	56,133	58,308	52,187	47,625	42,540	34,511	48,511	31,701	30,830	37,502	41,098	39,031	†32,000	†35,360	†41,936

Asterisks show new high records.
(a)Figures for 1932 do not include electric and crucible steel ingots.
†With December estimated.

Steel Castings Orders in the United States

(*From United States Department of Commerce*)

(*Net Tons*)

	Jan.	Feb.	March	April	May	June	Half Year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Second Half	Year
1920	80,663	85,326	125,952	99,201	97,652	85,795	574,589	78,858	76,932	78,267	56,757	49,668	42,368	382,850	957,439
1921	34,401	33,906	29,260	24,512	23,311	23,739	169,129	20,177	23,327	27,822	38,105	47,286	37,200	193,917	363,046
1922	43,230	46,520	60,080	94,920	97,350	112,120	454,220	83,010	79,560	122,840	94,980	76,400	88,420	543,210	997,430
1923	126,481	112,399	172,101	118,196	117,834	109,756	756,767	73,600	76,208	71,506	64,677	63,870	61,016	410,877	1,167,644
1924	69,872	91,502	126,986	93,518	79,988	68,019	529,885	54,538	50,321	76,005	83,221	91,388	115,605	471,078	1,000,963
1925	104,179	81,930	83,812	87,556	78,417	66,437	502,331	72,294	71,160	62,198	80,510	86,957	105,593	479,012	981,343
1926	112,322	101,495	113,770	91,540	84,451	73,785	577,363	79,798	71,325	69,740	77,836	73,477	90,143	462,319	1,039,682
1927	108,063	94,938	90,353	81,403	73,043	91,199	539,001	74,569	63,938	52,742	52,160	63,075	77,436	383,920	922,921
1928	91,448	91,076	83,755	84,086	86,796	72,107	509,268	66,992	81,286	82,762	78,860	84,742	96,315	490,960	1,000,228
1929	124,313	115,639	130,836	144,366	113,092	94,873	723,119	103,046	101,514	86,241	135,879	97,635	89,985	614,300	1,337,419
1930	101,500	114,419	122,462	92,987	91,077	61,164	583,609	57,850	50,370	49,542	45,552	48,123	49,387	300,824	884,433
1931	46,810	40,320	48,184	46,039	39,052	26,136	246,541	32,869	27,458	23,073	22,854	20,001	20,799	147,054	393,595
1932	17,344	17,010	16,588	12,801	11,342	12,765	87,850	9,301	10,147	11,883	11,853	13,235	.....	.....	.....

Pig Iron Production of the United States

(THE IRON AGE *figures, including ferroalloys made in blast furnaces, but excluding charcoal iron*)

(Thousands of Gross Tons)

	Jan.	Feb.	March	April	May	June	Half Year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Second Half	Year
1884	308	289	311	302	313	299	1,822	342	321	297	307	304	296	1,867	3,689
1885	278	275	313	297	302	286	1,751	308	305	294	315	333	382	1,937	3,688
1886	368	334	397	*428	*465	455	2,447	*473	460	448	*477	471	*497	*2,826	*5,273
1887	493	463	*522	513	454	359	2,804	413	486	*531	*569	550	548	*3,097	*5,901
1888	507	424	447	453	483	457	2,771	464	492	500	546	566	*616	*3,184	*5,955
1889	601	535	594	564	557	533	*3,384	562	566	564	*626	*642	*684	*3,644	*7,028
1890	*709	653	*734	713	*739	701	*4,249	712	703	706	*742	730	733	*4,326	*8,575
1891	612	492	481	429	512	607	3,133	731	728	726	*789	784	*812	*4,570	7,703
1892	784	745	792	736	732	690	4,479	690	651	635	700	717	747	4,140	*8,619
1893	728	665	754	739	755	674	4,315	564	407	322	326	373	431	2,423	6,738
1894	445	426	534	517	386	319	2,627	441	584	640	691	708	744	3,808	6,435
1895	706	617	672	648	668	679	3,990	776	*827	*845	*923	*926	*934	*5,231	*9,221
1896	873	779	810	785	799	751	4,797	721	608	491	499	550	647	3,516	8,313
1897	702	654	747	728	746	710	4,287	719	764	813	901	927	*986	5,110	*9,397
1898	974	895	*1,000	965	978	910	*5,722	924	915	907	974	985	*1,050	*5,755	*11,477
1899	1,033	906	1,022	1,034	*1,086	1,077	*6,158	*1,149	*1,159	1,145	*1,226	1,223	*1,276	*7,178	*13,336
1900	*1,285	1,158	1,264	1,226	1,282	1,215	*7,430	1,132	1,018	939	935	920	1,031	5,975	*13,405
1901	1,162	1,134	1,279	1,257	*1,339	1,318	*7,489	*1,360	1,336	1,300	*1,382	1,362	1,266	*8,006	*15,495
1902	*1,428	1,258	*1,445	*1,475	*1,543	1,447	*8,595	1,442	1,468	1,419	1,481	1,433	1,537	*8,780	*17,375
1903	1,473	1,391	*1,590	*1,608	*1,714	1,673	*9,449	1,546	1,571	1,554	1,426	1,039	847	7,983	17,432
1904	924	1,208	1,451	1,561	1,537	1,296	7,977	1,121	1,173	1,358	1,455	1,487	1,616	8,210	16,187
1905	*1,782	1,597	*1,936	1,922	*1,964	1,793	*10,994	1,742	1,844	1,899	*2,053	2,014	2,046	*11,598	*22,592
1906	*2,069	1,904	*2,165	2,073	2,097	1,977	*12,287	2,013	1,927	1,971	*2,197	2,188	*2,235	*12,531	*24,818
1907	2,206	2,045	2,226	2,219	*2,295	2,235	*13,226	2,256	2,250	2,184	*2,337	1,828	1,234	12,089	*25,315
1908	1,045	1,078	1,228	1,150	1,166	1,092	6,759	1,218	1,360	1,419	1,567	1,578	1,741	8,883	15,642
1909	1,798	1,707	1,836	1,739	1,883	1,931	10,894	2,103	2,249	*2,385	*2,600	2,547	*2,636	*14,520	*25,414
1910	2,609	2,397	2,618	2,484	2,390	2,265	*14,763	2,149	2,107	2,056	2,093	1,910	1,778	12,093	*26,856
1911	1,759	1,795	2,171	2,065	1,893	1,788	11,477	1,793	1,927	1,977	2,102	2,000	2,043	11,842	23,318
1912	2,058	2,101	2,405	2,375	2,513	2,441	13,893	2,411	2,512	2,464	*2,690	2,631	*2,782	*15,490	*29,383
1913	*2,795	2,586	2,764	2,753	*2,822	2,629	*16,349	2,561	2,546	2,506	2,546	2,233	1,984	14,376	*30,725
1914	1,885	1,888	2,348	2,270	2,093	1,918	12,402	1,958	1,995	1,883	1,778	1,518	1,516	10,648	23,050
1915	1,601	1,675	2,064	2,117	2,263	2,381	12,101	2,563	2,780	*2,853	*3,126	3,037	*3,203	*17,562	29,663
1916	3,185	3,087	*3,339	3,227	*3,361	3,211	*19,410	3,224	3,204	3,202	*3,509	3,312	3,178	*19,629	*39,039
1917	3,151	2,645	3,252	3,335	3,417	3,270	19,070	3,342	3,248	3,134	3,303	3,206	2,883	19,116	38,186
1918	2,412	2,319	3,213	3,288	3,447	3,324	18,003	3,421	3,389	3,418	3,487	3,354	3,434	20,503	38,506
1919	3,303	2,940	3,090	2,478	2,108	2,115	16,034	2,429	2,743	2,488	1,864	2,392	2,633	14,549	30,583
1920	3,015	2,979	3,376	2,739	2,986	3,044	18,139	3,067	3,147	3,129	3,293	2,935	2,704	18,275	36,414
1921	2,416	1,937	1,596	1,193	1,221	1,065	9,428	866	954	986	1,247	1,415	1,649	7,116	16,544
1922	1,645	1,630	2,036	2,072	2,306	2,361	12,050	2,405	1,816	2,034	2,639	2,849	3,087	14,830	26,880
1923	3,229	2,994	*3,524	*3,550	*3,868	3,676	*20,841	3,678	3,450	3,126	3,149	2,894	2,921	19,218	*40,059
1924	3,019	3,075	3,466	3,233	2,615	2,026	17,434	1,785	1,887	2,053	2,477	2,510	2,962	13,674	31,108
1925	3,370	3,214	3,564	3,259	2,931	2,674	19,012	2,664	2,705	2,726	3,023	3,023	3,250	17,391	36,403
1926	3,816	2,923	3,442	3,450	3,482	3,235	19,848	3,223	3,201	3,136	3,334	3,237	3,091	19,222	39,070
1927	3,104	2,941	3,483	3,422	3,391	3,090	19,431	2,951	2,947	2,775	2,784	2,648	2,696	16,801	36,232
1928	2,870	2,900	3,200	3,185	3,284	3,082	18,521	3,072	3,137	3,062	3,374	3,302	3,370	19,317	37,838
1929	3,442	3,206	3,714	3,663	*3,898	3,717	*21,621	3,785	3,756	3,498	3,588	3,181	2,837	20,665	*42,286
1930	2,827	2,839	3,246	3,182	3,233	2,934	18,261	2,639	2,524	2,277	2,165	1,867	1,666	13,139	31,399
1931	1,714	1,707	2,032	2,020	1,994	1,639	11,105	1,463	1,281	1,169	1,173	1,103	980	7,170	18,275
1932	972	964	967	852	783	628	5,168	572	520	592	644	631	†623	†3,582	†8,750

*High records for periods specified.
†Estimated, as to December.

Pig Iron Made in the United States

(Gross Tons a Day)

	Jan.	Feb.	March	April	May	June	Half Year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Second Half	Year
1884	9,951	9,985	10,019	10,053	10,087	9,966	10,011	11,031	10,348	9,904	9,904	10,126	9,546	10,145	10,078
1885	8,965	9,825	10,106	9,891	9,742	9,527	9,673	9,924	9,855	9,787	10,148	11,113	12,319	10,525	10,103
1886	11,868	11,931	12,817	*14,257	*15,016	*15,159	*13,521	*15,265	14,845	14,910	*15,394	*15,685	*16,041	*15,357	*14,447
1887	15,918	*16,544	*16,826	*17,090	14,633	11,979	*15,489	13,320	15,685	*17,706	*18,346	18,329	17,678	*16,831	*16,167
1888	16,352	14,622	14,422	15,099	15,586	15,239	15,227	14,972	15,869	16,648	17,624	*18,866	*19,871	*17,303	*16,265
1889	19,384	19,124	19,147	18,802	17,980	17,774	*18,699	18,115	18,254	18,809	*20,203	*21,404	*22,053	*19,803	*19,256
1890	*22,888	*23,320	*23,687	*23,759	*23,816	23,380	*23,476	22,979	22,664	23,521	*23,942	*24,321	23,642	*23,507	*23,492
1891	19,747	17,590	15,512	14,301	16,518	20,226	17,312	23,571	23,465	24,194	*25,456	*26,139	*26,206	*24,834	21,104
1892	25,303	25,679	25,551	24,521	23,622	23,006	24,611	22,263	21,012	21,161	22,583	23,886	24,102	22,501	*23,550
1893	23,482	23,758	24,323	24,654	24,357	22,444	23,841	18,179	13,146	10,720	10,518	12,428	13,901	13,166	18,459
1894	14,350	15,203	17,246	17,229	12,450	10,639	14,515	14,221	18,826	21,339	22,284	23,604	24,011	20,695	17,630
1895	22,766	22,024	21,680	21,619	21,556	22,625	22,044	25,035	*26,662	628,151	*29,788	*30,862	30,143	*28,429	*25,263
1896	28,156	26,861	26,133	26,170	25,784	25,028	26,358	23,255	19,620	16,378	16,079	18,339	20,858	19,107	22,713
1897	22,629	23,375	24,108	24,270	24,063	23,655	23,685	23,210	24,634	27,089	29,071	*30,904	*31,815	27,774	*25,746
1898	31,427	*31,978	*32,262	32,152	31,530	30,334	*31,612	29,817	29,533	30,228	31,406	*32,829	*33,881	31,279	*31,444
1899	33,325	32,360	32,948	*34,464	*35,039	*35,899	*34,020	*37,065	*37,374	*38,156	*39,566	*40,782	*41,162	*39,012	*36,539
1900	*41,441	41,360	40,759	40,856	41,368	40,504	*41,047	36,507	32,839	31,322	30,167	30,678	33,239	32,474	*36,725
1901	37,498	40,487	41,274	*41,896	*43,206	*43,916	*41,377	43,859	43,090	43,329	*44,587	*45,398	40,845	*43,509	*42,452
1902	*46,054	44,915	*46,613	*49,182	*49,769	48,225	*47,488	46,512	47,360	47,287	47,772	47,763	49,589	*47,716	*47,603
1903	47,509	49,665	*51,305	*53,614	*55,278	*55,774	*52,205	49,877	50,681	51,791	45,989	34,654	27,313	43,386	*47,759
1904	29,795	41,668	46,820	52,039	49,580	43,191	43,831	36,155	37,830	45,261	46,944	49,554	52,129	44,616	44,226
1905	*57,479	57,048	*62,460	*64,068	63,346	59,773	*60,739	56,191	59,473	63,317	*66,231	*67,121	65,991	*63,039	*61,896
1906	66,739	*68,001	*69,859	69,107	67,701	65,891	*67,885	64,948	62,153	65,699	*70,865	*72,922	72,107	*68,103	*67,995
1907	71,149	*73,039	71,871	*73,975	*74,049	*74,486	*73,074	72,763	72,594	72,783	*75,386	60,939	39,815	65,701	*69,357
1908	33,718	37,163	39,619	38,320	37,603	36,404	37,139	39,294	43,865	47,300	50,555	52,595	56,158	48,277	42,739
1909	57,986	60,976	59,232	57,963	60,753	64,362	60,189	67,853	72,546	*79,507	*83,856	*84,917	*85,022	*78,915	*69,629
1910	84,149	*85,616	84,450	82,792	77,103	75,516	*81,565	69,305	67,963	68,539	67,520	63,659	57,349	65,719	*73,577
1911	56,752	64,090	70,039	68,839	61,079	59,586	63,376	57,839	62,150	65,903	67,811	66,648	65,912	64,357	63,870
1912	66,384	72,442	77,591	79,181	81,051	81,358	76,334	77,771	81,046	82,128	*86,772	*87,695	*89,766	*84,188	*80,283
1913	*90,172	*92,369	89,147	91,759	91,039	87,619	*90,325	82,601	82,121	83,531	82,139	74,453	63,987	78,129	*84,177
1914	60,808	67,453	75,739	75,665	67,506	63,926	68,519	63,150	64,363	62,753	57,361	50,611	48,896	57,868	63,150
1915	51,659	59,813	66,575	70,550	73,015	79,361	66,855	82,691	89,666	*95,085	*100,822	*101,244	*103,333	95,444	81,267
1916	102,746	*106,456	*107,667	107,592	*108,422	107,053	*106,651	104,017	103,346	106,746	*113,189	110,394	102,505	*106,684	*106,668
1917	101,643	94,473	104,882	111,165	110,239	109,002	105,359	107,820	104,772	104,465	106,550	106,859	92,997	103,892	104,619
1918	77,799	82,839	103,648	109,607	111,175	110,793	99,462	110,354	109,339	*113,942	112,482	111,802	110,762	*111,432	105,496
1919	106,525	105,006	99,685	82,607	68,002	70,495	88,584	78,339	88,496	82,932	60,115	79,745	84,944	79,071	83,788
1920	97,264	102,720	108,900	91,327	96,312	101,451	99,665	98,931	101,529	104,310	106,212	97,830	87,222	99,321	99,492
1921	77,945	69,187	51,468	39,768	39,394	35,494	52,089	27,889	30,780	32,850	40,215	47,183	53,196	38,671	45,325
1922	53,063	58,214	65,675	69,070	74,409	78,701	66,578	77,592	58,586	67,791	85,092	94,990	99,577	80,596	73,645
1923	104,181	106,939	113,673	*118,324	*124,764	122,548	*115,147	118,656	111,274	104,184	101,586	96,476	94,225	104,444	*109,713
1924	97,384	106,026	111,809	107,781	84,358	67,539	95,794	57,577	60,875	68,439	79,907	83,656	95,539	74,314	84,995
1925	108,720	114,791	114,975	108,632	94,542	89,115	105,039	85,936	87,241	90,873	97,528	100,767	104,853	94,519	99,831
1926	106,974	104,408	111,032	115,004	112,304	107,844	109,660	103,978	103,241	104,543	107,553	107,890	99,712	104,467	107,043
1927	100,123	105,024	112,366	114,074	109,385	102,988	107,351	95,199	95,073	92,498	89,810	88,279	86,960	91,313	99,266
1928	92,573	100,004	103,215	106,183	105,931	102,733	101,763	99,091	101,180	102,077	108,832	110,084	108,705	104,983	103,382
1929	111,044	114,507	119,822	122,087	*125,745	123,908	*119,562	122,100	121,151	116,585	115,745	106,047	91,513	112,307	*115,851
1930	91,209	101,390	104,715	106,062	104,283	97,804	100,891	85,146	81,417	75,890	69,831	62,237	53,732	71,401	86,025
1931	55,299	60,950	65,556	67,317	64,325	54,621	61,356	47,201	41,308	38,964	37,848	36,782	31,625	38,955	50,069
1932	31,380	33,251	31,201	28,430	25,276	20,935	28,412	18,461	17,115	19,753	20,800	21,042	†20,097	†19,553	†23,982

*High records for periods specified.
†With December estimated.

Fabricated Structural Steel Orders in the United States

(From United States Department of Commerce)

(Computed, Net Tons)

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1909	70,200	70,200	187,200	261,000	280,800	160,200	192,600	205,200	109,800	97,200	127,800	131,400	1,893,600
1910	159,360	128,640	167,040	153,600	192,000	205,440	101,760	115,200	78,720	76,800	63,360	90,240	1,532,160
1911	114,800	94,300	135,300	114,800	129,150	159,900	141,450	166,050	153,750	106,600	180,400	178,350	1,674,850
1912	154,070	169,260	147,560	128,030	219,170	160,580	154,070	175,770	141,050	199,640	138,880	145,390	1,933,470
1913	130,500	162,000	110,250	90,000	119,250	96,750	130,500	96,750	65,250	78,750	60,750	60,750	1,201,500
1914	140,740	143,010	172,520	199,760	129,390	127,120	154,360	63,560	86,260	79,450	45,400	79,450	1,421,020
1915	57,750	69,300	147,840	143,220	140,910	184,800	198,660	196,350	154,770	180,180	242,550	279,510	1,995,840
1916	164,220	178,500	242,760	173,740	190,400	138,040	114,240	152,320	126,140	183,260	185,640	204,680	2,053,940
1917	147,620	142,780	164,560	147,620	135,520	113,740	101,640	91,960	70,180	147,620	186,340	275,880	1,725,460
1918	136,740	144,480	121,260	165,120	154,800	144,480	299,280	147,060	154,800	110,940	69,660	74,820	1,723,440
1919	31,920	34,580	47,880	66,500	130,340	172,900	196,840	207,480	207,480	207,480	183,540	226,100	1,713,040
1920	207,000	262,200	231,840	187,680	171,120	138,000	138,000	110,400	118,680	71,760	74,520	71,760	1,782,960
1921	50,940	39,620	82,070	87,730	79,240	104,710	96,220	93,390	135,840	152,820	155,650	113,200	1,191,430
1922	121,600	133,760	234,080	258,400	240,160	221,920	206,720	206,720	194,560	176,320	152,000	185,440	2,331,680
1923	227,760	243,360	290,160	243,360	177,840	165,360	162,240	184,080	165,360	159,120	171,600	249,600	2,439,840
1924	224,940	228,200	291,680	208,640	192,340	208,640	224,940	195,600	211,900	211,900	270,580	247,760	2,647,120
1925	187,380	194,320	225,550	256,780	229,020	284,540	274,130	267,190	270,660	298,420	239,430	253,310	2,980,730
1926	208,800	208,800	234,000	252,000	266,400	262,800	248,400	284,400	216,000	223,200	223,200	259,200	2,894,400
1927	195,000	240,000	232,500	262,500	232,500	225,000	341,250	270,000	262,500	288,750	236,250	262,500	3,048,750
1928	207,900	265,650	257,950	234,850	308,000	296,450	296,450	354,200	319,550	257,950	242,550	246,400	3,287,900
1929	256,025	250,635	334,565	313,775	321,475	324,170	329,175	340,725	297,990	319,550	212,135	297,605	3,597,825
1930	238,800	267,600	236,800	222,800	297,200	253,600	270,000	252,000	155,600	209,200	151,200	152,800	2,707,600
1931	158,000	158,800	178,800	284,800	152,400	172,400	159,600	124,000	194,400	109,200	90,800	97,600	1,580,800
1932	48,400	62,000	64,400	64,800	99,800	86,800	67,200	78,800	111,200	74,400	51,600	.....	.....

Bookings of Fabricated Steel Plate in the United States

(From United States Department of Commerce)

(Net Tons)

	Jan.	Feb.	March	April	May	June	Half Year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Second Half	Year
1923	64,832	61,797	75,065	59,850	40,081	62,736	364,361	62,510	40,990	42,945	38,598	31,846	28,806	245,695	610,056
1924	25,563	19,803	25,341	23,688	29,429	34,125	157,949	26,268	36,287	23,270	28,566	36,881	52,606	203,878	361,827
1925*	30,013	24,167	26,777	27,656	32,889	38,496	179,998	34,382	40,660	31,001	34,766	32,847	35,792	209,448	389,446
1926*	29,965	39,889	43,089	39,662	52,890	44,938	250,439	37,300	51,342	38,860	45,139	63,271	30,034	265,939	516,378
1927	36,043	59,843	55,675	47,611	38,063	28,936	266,171	35,609	48,780	38,863	47,296	27,524	35,877	233,949	500,120
1928	51,647	64,909	55,016	55,552	49,313	40,738	317,175	41,629	51,008	43,499	59,836	62,914	52,204	311,090	628,265
1929	40,570	70,314	69,344	54,246	58,293	57,975	350,739	58,456	51,590	51,842	45,661	52,642	27,742	287,936	638,675
1930	57,083	34,662	46,137	45,454	38,328	41,774	263,439	38,283	36,513	41,066	30,197	33,151	26,787	205,996	469,435
1931	27,518	24,438	31,056	29,916	26,210	22,806	161,944	27,261	24,282	33,473	20,839	18,268	16,442	140,565	302,509
1932	17,613	17,755	12,564	14,074	17,888	18,383	98,277	12,485	11,916	11,109	16,737	7,168	.....	.....	.....

*During these years additional plants were added to those reporting monthly tonnages.

Steel Sheets Produced by Independent Makers

(National Association of Flat Rolled Steel Manufacturers)

(Hot-Rolled Annealed, Galvanized and Full-Finished, Net Tons)

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1919	132,796	127,168	110,339	112,720	108,739	119,363	115,324	129,861	102,035	79,872	128,617	143,405	1,410,239
1920	185,271	177,410	198,606	165,811	161,645	166,819	142,023	188,458	198,467	202,703	185,450	85,204	2,057,867
1921	37,011	45,520	74,239	85,592	106,969	83,374	49,096	94,900	106,454	131,577	127,983	82,198	1,024,913
1922	86,130	122,439	166,244	184,979	218,739	210,464	179,100	228,398	202,600	243,476	242,562	205,239	2,290,370
1923	260,520	237,919	279,475	251,808	260,006	218,432	174,910	234,112	185,577	225,714	188,144	155,299	2,671,916
1924	274,097	275,118	278,767	234,000	176,582	114,807	144,291	190,436	217,981	247,222	224,931	259,794	2,638,026
1925	317,424	283,290	290,308	280,082	260,470	266,290	246,404	270,212	295,810	348,714	336,021	326,960	3,521,985
1926	328,643	299,553	319,132	294,811	264,541	268,448	239,764	293,703	307,459	314,598	278,455	238,345	3,447,452
1927	256,856	282,171	359,340	316,100	309,360	300,706	237,243	266,645	220,919	245,765	232,041	260,130	3,285,276
1928	316,541	330,565	366,127	327,909	349,367	311,629	267,684	329,396	318,907	369,243	358,402	302,182	3,947,952
1929	391,404	326,468	364,202	375,256	393,430	337,841	323,905	366,734	302,490	319,660	204,071	181,916	3,887,377
1930	291,529	275,952	259,658	308,988	274,220	205,675	186,206	173,956	179,928	193,934	148,550	145,125	2,643,721
1931	167,865	192,218	224,323	213,608	201,846	147,843	174,890	123,752	116,842	122,739	102,758	101,570	1,890,254
1932	118,921	124,157	110,559	101,559	96,180	85,232	60,956	57,417	89,817	108,111	90,679	.....	.....

Shipments of Steel Barrels in the United States

(From United States Department of Commerce)

(Number)

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1921	120,903	125,789	140,382	191,155	137,862	137,766	148,852	239,263	180,172	255,229	200,306	190,778	2,068,457
1922	178,432	203,060	336,952	400,428	450,744	533,888	441,984	488,542	412,896	378,966	388,139	402,639	4,616,670
1923	457,824	431,093	565,718	544,722	520,978	461,251	468,047	482,504	365,580	393,496	343,471	321,440	5,356,124
1924	303,668	362,725	394,756	420,129	425,397	382,550	407,258	398,312	389,064	441,851	389,230	407,474	4,722,414
1925	415,040	407,781	510,928	605,424	569,670	508,880	506,894	495,736	503,221	555,981	498,070	474,742	6,052,364
1926	469,432	518,104	622,312	608,056	582,352	624,082	593,611	511,542	508,548	497,081	505,383	546,392	6,586,845
1927	525,518	503,183	568,821	609,090	575,712	605,123	576,602	610,454	525,374	572,893	497,345	454,638	6,624,754
1928	474,159	514,362	644,521	661,949	694,843	717,496	645,881	675,600	595,640	661,009	568,353	549,913	7,408,726
1929	548,581	563,532	743,407	775,481	834,432	779,567	782,411	809,860	655,314	638,681	567,257	619,058	8,317,581
1930	643,120	599,324	785,951	766,617	736,147	638,358	621,091	552,265	565,204	619,558	500,409	406,327	7,434,371
1931	427,622	449,485	554,332	600,566	618,801	549,781	581,450	455,502	452,960	492,145	444,201	385,435	6,012,280
1932	352,135	369,882	453,621	452,191	432,455	654,561	353,336	360,509	398,241	417,470	376,647	.....	.....

Malleable Castings Produced in the United States

(From United States Department of Commerce)

(Net Tons)

	Jan.	Feb.	March	April	May	June	Half Year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Second Half	Year
1923	.....	.....	.....	.....	76,818	75,810	.....	68,306	80,030	71,654	74,724	63,057	58,488	416,259	.....
1924	75,550	77,203	80,600	66,923	57,583	39,985	397,844	36,562	40,188	45,105	54,638	51,862	63,523	291,878	689,722
1925	71,188	64,825	65,889	67,608	65,714	63,343	398,567	61,727	61,042	62,798	73,195	65,248	70,622	394,632	793,199
1926	66,776	71,161	80,116	72,241	65,106	66,358	421,758	60,384	62,218	63,399	62,321	50,946	55,561	354,829	776,587
1927	56,627	62,335	72,205	64,612	62,747	64,310	382,836	53,046	57,096	50,807	52,458	46,698	53,824	313,929	696,765
1928	61,072	65,359	70,070	63,380	67,903	67,090	394,874	60,290	68,606	62,665	70,054	63,560	59,428	384,603	779,477
1929	73,125	73,875	83,365	83,744	81,641	72,232	467,982	70,600	69,173	59,087	65,526	46,459	46,029	356,874	824,856
1930	61,381	65,942	63,464	61,984	53,502	39,347	345,620	30,911	25,614	26,785	28,785	27,114	30,431	169,383	515,003
1931	31,665	34,076	35,758	36,682	31,964	24,248	194,393	20,223	18,821	18,485	20,444	17,984	21,503	117,460	311,853
1932	22,216	21,578	19,597	16,758	17,430	15,143	112,722	9,703	7,038	10,168	12,586	13,912	.....	.....	.....

Figures prior to June, 1923, not available.

Automobiles Produced in the United States and Canada

(Cars and Trucks)

(From United States Census Bureau and Dominion Bureau of Statistics)

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total—United States and Canada
1923	256,019	290,130	374,600	395,086	414,256	395,025	343,726	358,572	337,337	375,864	323,675	316,260	4,180,450
1924	330,177	384,320	400,658	392,249	332,221	263,507	279,538	291,009	304,321	302,180	241,654	215,952	3,737,786
1925	251,247	296,158	390,247	452,851	439,195	413,944	410,987	269,199	338,532	457,094	383,021	325,325	4,427,800
1926	324,477	382,490	455,841	460,838	450,101	408,020	374,818	442,136	416,433	349,091	266,129	175,287	4,505,661
1927	254,284	323,390	417,763	430,993	431,356	343,025	280,383	322,520	271,572	227,430	140,987	136,677	3,580,380
1928	240,191	336,300	430,783	434,315	459,725	425,195	417,312	492,543	436,507	415,820	268,909	243,541	4,601,141
1929	422,538	497,705	626,076	663,811	636,250	567,424	518,301	512,842	429,729	394,540	226,997	125,502	5,621,715
1930	283,610	345,961	417,118	468,281	444,699	349,596	275,721	234,160	228,606	158,942	142,161	161,323	3,510,178
1931	178,344	229,811	289,398	354,098	329,901	257,475	222,710	191,741	143,212	81,582	70,114	123,973	2,472,359
1932	123,075	122,895	127,277	155,136	192,505	190,204	118,613	94,391	86,483	51,857	†60,000	†110,000	†1,432,166

In no year prior to 1922 did total United States production reach 2,200,000 units.
†With November and December estimated.

Railroad Freight Cars Ordered in the United States

(From Railway Age)

1915	149,156	1924	137,927
1916	169,247	1925	80,052
1917	137,247	1926	57,155
1918	182,193	1927	59,590
1919	22,804	1928	41,239
1920	70,072	1929	101,169
1921	18,525	1930	40,982
1922	161,747	1931	10,880
1923	88,729	1932	1,734

Locomotives Ordered in the United States

(From Railway Age)

1915	2,004	1924	1,410
1916	5,276	1925	1,217
1917	4,849	1926	1,339
1918	3,133	1927	703
1919	1,167	1928	409
1920	2,529	1929	1,119
1921	739	1930	401
1922	2,427	1931	235
1923	1,959	1932	7

Production of Steel Trackwork in the United States

(For T-rail track of 60 lb. and heavier)

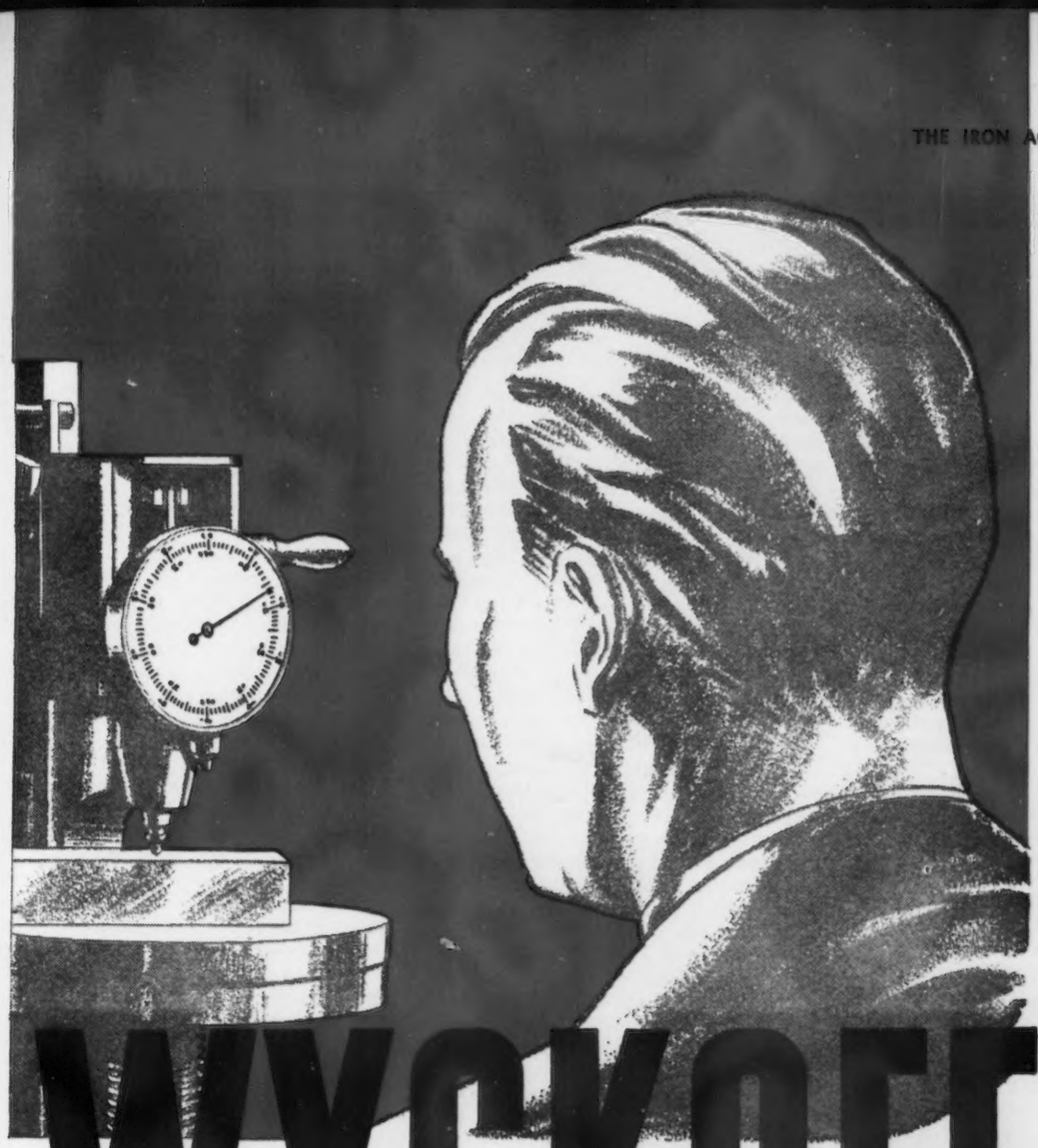
(From American Iron and Steel Institute, in Net Tons)

	Jan.	Feb.	March	April	May	June	Half Year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Second Half	Year
1925	11,096	14,392	17,965	16,792	17,075	17,416	94,736	13,858	12,982	11,373	12,689	12,281	13,475	76,658	171,394
1926	15,247	16,158	19,756	19,547	19,196	18,762	108,666	15,635	15,203	15,159	15,568	12,225	14,549	87,339	196,005
1927	12,969	13,678	19,216	17,081	16,768	14,557	94,269	13,217	13,387	10,999	9,914	9,706	9,139	66,362	160,631
1928	9,332	11,371	15,058	13,511	14,139	13,718	77,129	11,776	11,039	10,768	9,493	8,379	11,061	62,516	139,645
1929	10,344	12,180	14,927	16,815	16,332	14,839	85,437	13,844	14,818	12,962	12,902	11,326	10,826	76,678	162,115
1930	11,830	12,524	13,096	13,508	12,779	10,553	74,290	8,774	6,812	5,642	5,192	4,212	5,174	35,806	110,116
1931	5,626	6,321	8,944	8,564	7,453	5,705	42,613	4,409	3,924	3,472	2,162	1,948	2,373	18,288	60,901
1932	2,936	2,765	3,229	3,340	3,061	1,975	17,306	1,890	1,797	1,430	1,245	1,765	....	....	....

Unfilled Orders, United States Steel Corporation

(End of month, in thousands of gross tons)

	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Jan.	3,111	5,380	7,827	4,614	4,249	7,923	11,474	9,478	6,684	9,285	7,573	4,242	6,911	4,798	5,037	4,883	3,800	4,276	4,109	4,469	4,132	2,648
Feb.	3,401	5,454	7,657	5,026	4,345	8,569	11,577	9,288	6,011	9,502	6,934	4,141	7,284	4,913	5,285	4,617	3,597	4,398	4,144	4,480	3,965	2,546
Mar.	3,447	5,305	7,469	4,654	4,256	9,331	11,712	9,056	5,431	9,892	6,285	4,494	7,403	4,783	4,864	4,380	3,553	4,335	4,411	4,571	3,995	2,472
Apr.	3,219	5,665	6,979	4.277	4,162	9,830	12,183	8,742	4,801	10,360	5,845	5,097	7,289	4,208	4,447	3,868	3,456	3,872	4,428	4,354	3,898	2,327
May	3,113	5,751	6,324	3,998	4,265	9,938	11,887	8,338	4,282	10,940	5,482	5,254	6,981	3,628	4,050	3,649	3,051	3,417	4,304	4,059	3,620	2,177
June	3,361	5,807	5.807	4,033	4,678	9,640	11,383	8,919	4,893	10,979	5,118	5,636	6,386	3,263	3,710	3,479	3,053	3,637	4,257	3,968	3,479	2,035
July	3,584	5,957	5,399	4,159	4,929	9,594	10,844	8,884	5,579	11,118	4,830	5,776	5,911	3,187	3,539	3,603	3,142	3,571	4,088	4,022	3,405	1,966
Aug.	3,696	6,163	5,223	4,213	4,908	9,660	10,407	8,759	6,109	10,805	4,532	5,950	5,415	3,290	3,513	3,542	3,196	3,624	3,658	3,580	3,169	1,970
Sept.	3,611	6,552	5,004	3,788	5,318	9,523	9,833	8,298	6,285	10,375	4,561	6,692	5,036	3,474	3,717	3,594	3,148	3,698	3,903	3,424	3,145	1,985
Oct.	3,694	7,594	4,514	3,461	6,165	10,015	9,010	8,353	6,473	9,837	4,287	6,902	4,673	3,525	4,109	3,684	3,341	3,751	4,087	3,482	3,119	1,997
Nov.	4,142	7,853	4,396	3,325	7,189	11,059	8,897	8,125	7,128	9,021	4,251	6,840	4,369	4,032	4,582	3,807	3,454	3,673	4,125	3,640	2,934	1,968
Dec.	5,085	7,932	4,282	3,837	7,806	11,547	9,382	7,379	8,265	8,148	4,268	6,746	4,445	4,817	5,033	3,961	3,973	3,977	4,417	3,944	2,735	....
Ave.	*3,655*	*6,284*	*5,907*	*4,115*	*5,189*	*9,719*	*10,716*	*8,635*	*5,995*	*10,022*	*5,331*	*5,648*	*6,009*	*3,993*	*4,324*	*3,922*	*3,397*	*3,852*	*4,161*	*4,034*	*3,466*	....



WYCKOFF

DEPENDABLE COLD DRAWN STEELS

THE RAPID DUPLICATION OF MACHINED STEEL PARTS AT LOWEST COST CONTINUES TO DEPEND UPON THAT PERFECTION AND PRECISION WHICH ONLY COLD DRAWN STEELS CAN GIVE.

That is why manufacturers, users and operators of automatic screw machines always specify **cold drawn steels** to attain the full production and profit advantages from their equipment.

In this period of exceptionally close margins,—you cannot afford to take chances with an inferior product. Only through the use of **cold drawn steel bars** can you obtain the increased physical characteristics, exactness to size, straightness and guaranteed machining performance so essential to the maintenance of present-day production costs.

The WYCKOFF organization will welcome an opportunity of cooperating with you,—any time.

Wyckoff Drawn Steel Company, Pittsburgh

WYCO COLD FINISHED STEELS

GENERAL OFFICES: FRICK BUILDING, PITTSBURGH, PA. CHICAGO OFFICES: 3800 SOUTH KEDZIE AVE., CHICAGO, ILL.

MILLS PITTSBURGH PA., CHICAGO, ILL.

Uncle Sam Ponders As Ivan Goes Industrial

Concluded from Page 21

"It is usually said that in regard to improving the economic relations with the bourgeois States, the question of debts is the stumbling block. I think that this is not so much an argument in favor of payment of the debts, as a pretext used by the aggressive elements for their interventionist propaganda. Our policy in this respect is perfectly clear and well-defined. On the condition that we are granted credits, we shall agree to pay a small part of the pre-war debts, looking upon it as an additional interest on the credit granted to us. Without this condition we cannot, and we shall not, pay. * * *"

Russian Indebtedness to This Country

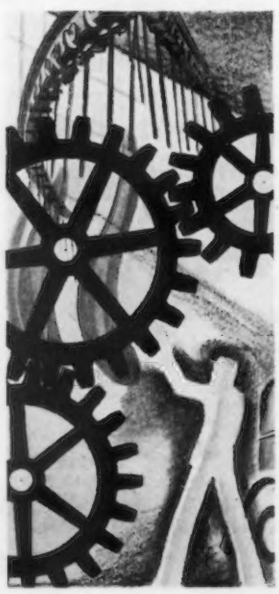
Russian governmental indebtedness to this country is comparatively small, as international debts go, amounting to about $284,000,000 without interest. P. V. Ohl in his work, "Foreign Capital in Russia," published in Leningrad in 1922, estimates that the total investment of the United States in Russian industrial, banking, and commercial enterprises at the time of the revolution was 117,750,000 rubles ($60,594,150). It is not known whether or not this total includes the reserve funds of American life insurance companies. The Equitable Life Assurance Co. and the New York Life Insurance Co. both wrote life insurance in imperial Russia. The New York Life Insurance Co. started business in Russia in 1885 and by the time of the Bolshevik revolution had written upward of $30,000,000 in life policies. The Equitable company entered the Russian field in 1891 and on a smaller scale than the New York Life company.

The volume of life insurance the Equitable company wrote in Russia is estimated at about $7,000,000. Both companies were required to establish large reserves in Russia, consisting of Russian Government bonds and other issues acceptable to the authorities. Equitable's reserve amounted to between $2,000,000 and $3,000,000, and the reserve of the New York Life company was correspondingly larger. When the Kerensky government was overthrown and all Russian obligations were repudiated, the New York company sought to have its obligations to Russian policyholders nullified. As a result, claims were filed by the latter in 1925, and litigation continued until April, 1929, when a settlement was reached, mostly on the basis of 13c. a ruble against surrender values.

The Question of Propaganda

Whatever the willingness of the Soviets to discharge the external public and private obligations of previous governments, there remains the propaganda issue. Will they follow a "live and let live" policy with regard to domestic politics in other countries? Some observers believe that they will, that they are now more interested in making a success of their own economy than in world revolution, that they realize that the success of their internal program depends upon continued peace in capitalistic countries. The fact is cited that the slump in world trade and world prices has reduced Soviet exports and hence Soviet ability to import.

But the official viewpoint in this country has been consistently one of suspicion of Soviet motives. Business men, it is stated, are prone to underestimate the fanaticism of Soviet leaders. The communistic faith is a religion with them and they believe themselves the chosen people. The Communist Party, it is asserted, directs the affairs of the Soviet Government as its agent at home and those of the Communist International as its agent abroad. Both the Government and the Comintern maintain their headquarters in Moscow, pursue the same aims, are actuated by the same political beliefs and have interlocking directorates. The Comintern is still, it is said, sponsoring propaganda in capitalistic countries. These efforts may not be so effective as in former years, but this is due to the fact that there is less money to spend on foreign propaganda and Russian internal troubles are consuming greater attention. Besides, the Comintern may have come to realize that the world outside is not yet ripe for a communist revolution, notwithstanding that the present depression, according to orthodox Marxian tenets, should automatically have produced an uprising by this time.



Nevertheless, the functions of the Communist International are being carried on as usual. These include laying down policies for the whole world and specific policies to meet situations in individual countries. Periodically the Comintern reviews what has been done in specific countries, pointing out errors that have been made and which should be avoided in the future, etc.

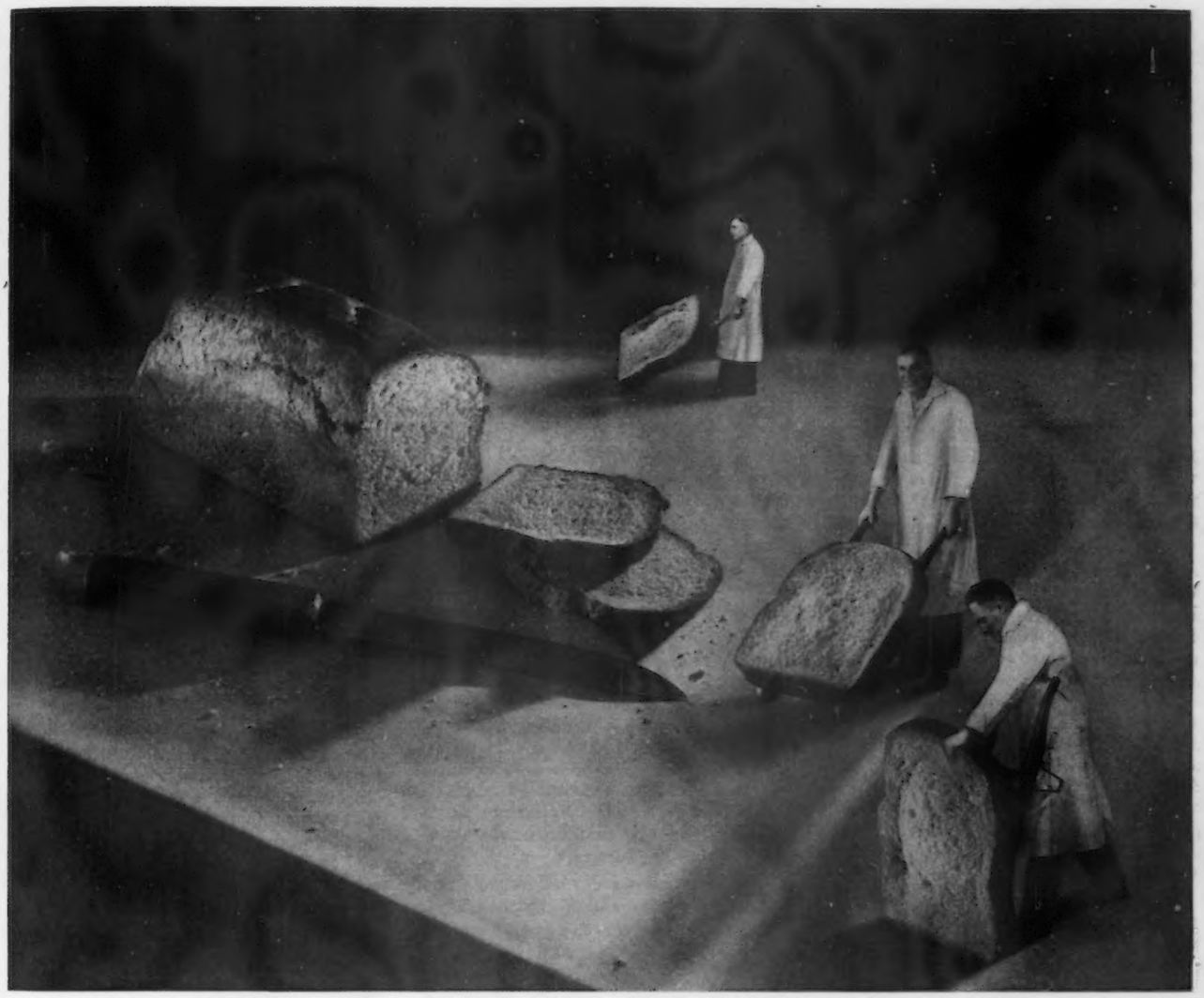
The world revolutionary aim of the Soviet Government is after all the root difficulty. The British Government worked out a very careful formula banning communistic propaganda, to which both it and the Soviet Government agreed. The French and Polish governments recently concluded non-aggression agreements with Soviet Russia which prohibit political agitation under the sponsorship of any of the parties to the treaties. However, all the formulas to which the Soviet Government has agreed have been so worded as to cover only *official* actions of the Government as such. There has been no agreement to restrain the activities of the Comintern despite the fact that, from the standpoint of personnel, the Soviet Government and the Comintern are virtually identical.

What Trade Statistics Show

Reverting to our trade with Russia, a sharp decline is reflected by the statistics of orders placed by the Soviets in this country in the past 26 months. Orders placed in the last three months of 1930 totaled $14,484,000. Orders placed in the 12 months of 1931 aggregated $51,232,000. Those placed in the first 11 months of 1932 totaled $8,808,000—less, it will be noted, than the figure for the last quarter of 1930. A very large part of the business placed last year was made up of industrial machinery, principally machine tools. Soviet purchases of agricultural machinery and tractors, which in 1931 amounted to 65 per cent of our exports of those products (largely on orders placed in 1930), have virtually ceased.

The high point of Russian obligations to this country, reached about 15 months ago, was about $110,000,000. By the beginning of December, this year, it had been reduced to approximately $22,000,000. Thus far the Soviet has met all its foreign payments when due without a single default.

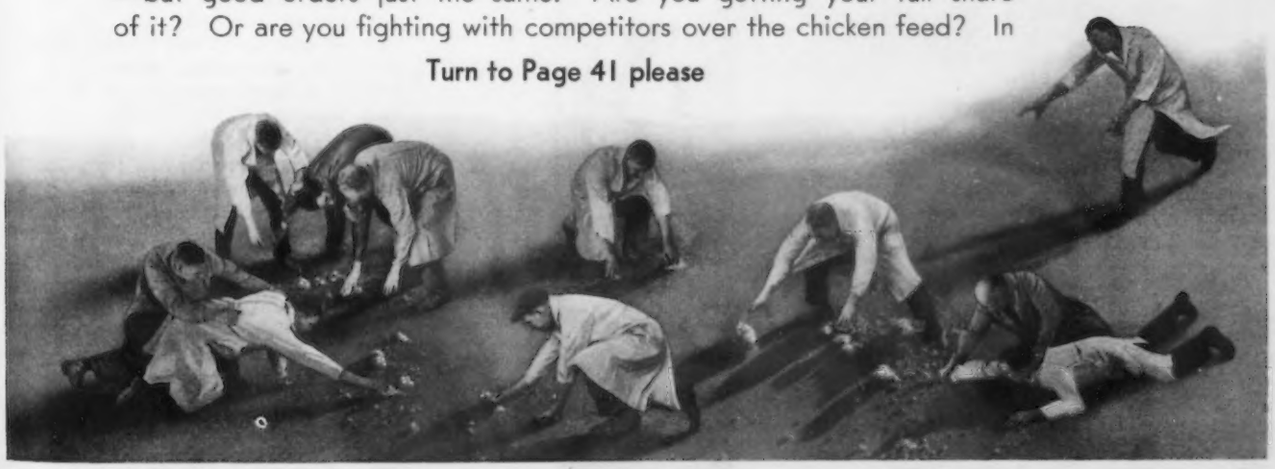
In 1930, the United States held first place as a source of Russian imports, with a total of 264,393,000 rubles, as compared with 250,828,000 rubles for Germany. In 1931, the United States was in second place with a total of 229,915,000 rubles, first place having been taken by Germany with an aggregate of 410,645,000 rubles. In the first nine months of 1932 Germany was again the leading exporter



Is your share a slice . . . . . or are you fighting for crumbs?

There is business to be had—not the big orders of 1929—but good orders just the same. Are you getting your full share of it? Or are you fighting with competitors over the chicken feed? In

Turn to Page 41 please



to Russia, sending to the Soviet Union goods valued at 250,000,000 rubles. England was second with exports valued at 71,400,000 rubles; Poland, third, with a total of 44,284,000 rubles; the United States, fourth, with 24,105,000 rubles; Italy, fifth, 23,639,000 rubles.

Russian imports of industrial machinery (exclusive of agricultural machinery, automobiles, tractors, etc.) in the first nine months of 1932 amounted to 171,344,000 rubles, as compared with 154,919,000 rubles in the corresponding period in 1931. Germany led as a supplier, shipping industrial machinery valued at 108,617,000 rubles. England was second with a total of 38,957,000 rubles. The figure for the United States was 8,209,000 rubles (compared with 43,617,000 rubles in the same period of 1931). Italy's total was 3,371,000 rubles.

It is evident that there has been a sharp drop in American exports to Russia and a corresponding rise in German and British exports. In 1931 Russia took 56 per cent of our exports of metal-working machinery and 65 per cent of our exports of agricultural equipment and tractors. Last year and in 1931 Russia took close to 80 per cent of British exports of machine tools. In the first half of 1932 the Soviets took 41.3 per cent of Germany's machinery exports, as compared with 17 per cent in the first half of 1931 and 10.3 in the initial half of 1930.

Of course, the reason for our loss of trade with Russia is that other countries offer better credit terms. Originally American companies doing business with Russia obtained a cash-down payment of 50 per cent upon shipment of the goods. Later this initial instalment was reduced to 25 per cent, and finally it became necessary to duplicate or approach the extended terms granted under governmental guarantees abroad. Only a relatively few financially strong companies can afford to do this. If they discount Russian paper in the open market, their profit is likely to be wiped out in view of price competition of European companies in the same field.

It is out of the question to look for a government guarantee in this country of Russian business, unless and until the United States recognizes the Soviet regime. Even then the question would arise whether Russia was a good business risk. The economic situation in Russia is, after all, abnormal. Quite apart from the good faith of the Soviets, their industrial experiment may break down.

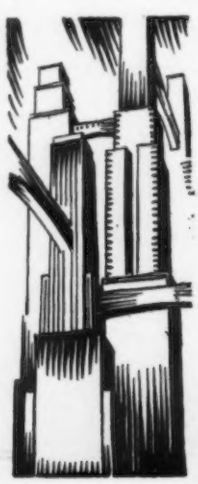
Plans Proposed to Promote Trade

Pending action on the issue of Russian recognition, various other plans of facilitating trade have been offered. A New York group of exporters suggested a barter plan, whereby commodities imported from Russia would be used as security for credits on Soviet purchases. The Amtorg Trading Corpn., however, made it clear that the proposal was "entirely unacceptable." It pointed out that the plan might result in tying up large stocks of Soviet products, possibly for long periods of time. Even if the commodities were sold immediately, the proceeds would be applied as a guarantee for commercial credits obtained, which would also mean tying up capital. In a nutshell, what Soviet Russia wants is credit. It wishes to sell for cash and to buy on time.

Another suggestion, made by the Joint Committee for Foreign Trade Action (a body comprising all importing and exporting groups in New York), is that the Reconstruction Finance Corporation act be amended so as to make definite provision for the acceptance by the R.F.C. of all current forms of foreign trade receivables as legal security for advances from its funds. The law now specifically states that security against acceptances which grow out of export transactions shall *not* include goods stored or in process of shipment in foreign countries or the obligation of any foreign government, firm or person.

The same group favors amending the Reconstruction Finance Corporation law or enacting other legislation to create the same or a similar type of Government guarantee, *without full recourse* on the exporter, as is now provided by the important trading nations of Europe.

New York exporters have also made pleas to a committee of the New York Clearing House for the establishment of an Edge Act bank. The committee reported that its members were not interested in the formation of such a bank at this time, but would lend advice if exporters chose to organize such an institution themselves. A bank formed under the Edge Act would handle foreign bills of exchange and against these would sell debentures to the public. The distribution of the risk would make the debentures safe, according to the theory. Since the sale of such debentures to the general public at present would be difficult, it is proposed that legislation be passed to make it possible to sell them to the R.F.C.



So far as Russia is concerned these financing plans all lead to one door, i. e., the United States Government. In other words, if Russia should default, the American taxpayers as a whole would find themselves holding the bag.

Facing Realities

A more practical suggestion, and one which recognizes realities, is that all of our export and import transactions with Russia be unified. After all, individual manufacturers selling to or buying from Russia are at a great disadvantage, from a bargaining standpoint, because they are not dealing with individuals but with one agency through which all of the Soviet foreign trade is controlled. By unifying all American business relations with Russia, all American payables could be used as security for (not necessarily 100 per cent), and as an offset to, American receivables. The Russian Government now has a single fiscal agent in this country and the machinery could be set up without great difficulty. In other words, Soviet-American financial transactions would be handled largely in this country. Money receivable from Russia would be used to cancel money payable to Russia. Different groups in this country, some importing and some exporting, would under this arrangement find themselves, in effect, dealing with each other instead of with the Soviet Government. The money would stay in this country, which would in no way interfere with Russia's objective of exchanging raw materials for manufactured products.

Of course, the objection may be raised that Russia has been buying about five times as much from us as we have been purchasing from her. It is true that the export and import figures show such a relationship. But that is not the whole story. American purchases of Russian products for distribution in other countries make the bilateral trade relationship much less one-sided. American companies handled $15,000,000 to $20,000,000 worth of Russian oil products in 1931, distributing virtually the entire amount outside of the United States. Similarly, American interests distribute a large quantity of Russian furs throughout the world.

This plan would be of a self-supporting nature. It would call for a minimum of risk and would make it possible for American manufacturers to compete on more favorable price terms with the foreign rivals. The plan, moreover, would not require the United States to underwrite Soviet Russia's future with extended credits or long-term loans. Finally, it would permit Russia to take our products as long as she is economically able to do so, but would not force us individually or as a country to suffer materially in case of eventual default.

SLICES . . . . . .

Continued from Page 39

. . . . . or crumbs?

other words, is your shop equipped to turn out good profitable work at a price interesting to 1933 hard-boiled buyers? That is the only kind of shop getting the "slices."

We are speaking in particular of die shops. Believe it or not, the good ones are busy and getting busier. ***We can show any die shop how to organize and equip to go out after orders today at 1933 prices and still make substantial profits, capital investment included.*** That is not a "white rabbit" statement, but a cold fact.

We have developed die sinking equipment capable of producing ***better*** dies ***at a 75% saving.*** That means just that. It is possible now to make a $100.00 die for $25.00. Some shops are getting the "slices" by doing it. The others have to "fight for crumbs."

The reason for this saving is simple. It means doing accurately on a machine in a few minutes, work that otherwise takes hours of laborious hand cutting.

Specifically the machine is the Pratt & Whitney No. 2A Universal Die Sinker. It applies a new idea to die sinking. It can produce either straight or cherrying cuts without special attachments or special cutters, using power feed. It has transformed the difficult, slow hand operation of cherrying into a fast machine cut, and produces the correct draft using only standard cutters. It leaves such an excellent finish that frequently only a little hand polishing is necessary to complete the die.

Find out how this new P & W Universal Die Sinker will bring ***you*** the slices instead of the crumbs. There is no better paying investment than the right tools for the job. When you see this new die sinker demonstrated, ***you too*** will be dissatisfied with your present equipment. In the meantime write for a circular describing it in detail.

75% reduction in die cost

with the new

PRATT & WHITNEY

No 2A *Universal* DIE SINKER

MACHINE TOOLS : SMALL TOOLS : GAGES : KELLER MACHINES : SPECIAL MACHINERY

PRATT & WHITNEY COMPANY

HARTFORD «» CONNECTICUT

Branch Offices and Agencies: — BIRMINGHAM BOSTON CHICAGO CINCINNATI CLEVELAND DETROIT
LOS ANGELES NEW YORK PHILADELPHIA PITTSBURGH ROCHESTER SAN FRANCISCO ST. LOUIS

New Year Opens in Midst of Major Debt Adjustments

(*Concluded from Page 26*)

The lines of solution of the debt problem of farms, railroads and utilities reflect these differences in fundamentals. Farmers need, more than anything else, a rise in agricultural prices. In the meantime, adjustment of individual mortgages has taken place and may go much further. Railroads do not need higher rates, but do need restoration of traffic. In the meantime, reorganization of the excess capital structure of about one-third of the outstanding debt seems to be in order. Utility operating companies are not, for the most part, in distress over their funded debt, whereas holding companies have already in large part been forced into readjustment.

Currency Inflation a Poor Debt Solvent

A rising tide of popular clamor for currency inflation as a debt solvent is apparent on every hand. A host of people, while saying they want inflation, end every argument with the query, "But how?" I do not find any currency scheme yet advocated in Washington which would, in fact and actuality, produce inflation. They all lack the power to produce the desired end. They might produce a new panic but they could not produce inflation.

This is because we live in a credit economy, in which currency is incidental. Artificial currency expansion may put out new dollars, but they will be spent only once. Thereafter they will come right back; they would be redundant. No act of Congress can give redundant currency velocity, turnover, cumulative use. History is quite clear on this point.

There is a formula by which currency inflation conceivably could be worked, but no Congressman seems to know it, and economists like druggists should not dispense poison to people who might use it for suicidal ends.

It is a separate question whether currency inflation is desirable, even if it could be produced. The writer believes it would be highly undesirable. If undertaken now, politicians would have gotten by without curbing their extravagance, real estate situations would not have been corrected for prior speculative excesses, and top-heavy railroad capitalizations would not have been scaled down to realities. Resort to currency inflation would reflect our lack of courage and character in facing certain minimum realities.

Moreover, once it was under way, it would engender a new speculative boom, new excesses, a new house of cards to crash later on. To talk of a "controlled currency inflation" is to talk without knowledge of history.

Others demand devaluation of the dollar, i. e., reduction of the gold content of the dollar, inasmuch as France and England have depreciated money units, the United States should have the same.

Devaluation No Cure

But when France devalued the franc to about one-fifth its original value, violent inflation was already an accomplished fact. Prices were 400 to 500 per cent above the prewar level, and the new legal definition of the franc was merely belated recognition of what had become an actuality. It would be sharply different for the United States to devalue the dollar at a time when not inflation but radical deflation is the actuality. Devaluation as such has no intrinsic power to create inflation. It does not automatically lead to inflation, and so offers no real relief to the domestic debt burden.

As for England, the pound was cheapened, not by any deliberate policy, but by the force of external liabilities. The pound depreciated in the foreign exchanges, but this did not produce any material inflation internally and did not, therefore, relieve the domestic debt burden. Britain's primary debt problem was foreign, not domestic; America's debt problem is just the reverse; domestic, not foreign. To duplicate England's performance would not in any important sense solve our domestic debt problem, and that is our real problem.

In this country devaluation would not, *ipso facto*, cause any more dollars to exist in the hands of debtors. That would be an additional and distinct step of pure inflation, and if we want pure inflation, we can do it directly, without bothering about devaluation.

Having taken a hostile attitude toward currency inflation and devaluation of the dollar, let us turn to a positive attitude, an attempt to outline constructively the next sound move toward solution of our debt problem. It is three-fold:

1. We should balance the national budget, and balance State and local budgets, striving to do so as much as possible by squeezing waste and unnecessary functions out of political affairs, and so striving to eliminate a major obstacle to business and financial progress.
2. We should expedite the irreducible minimum of necessary individual adjustments of debts by reorganization, scaling down of top-heavy capital structures, and receiverships where necessary, striving meantime to so limit the sacrifices as to preserve the solvency of our basic financial institutions.
3. We should exert pressure upward on the price level by, (a) continuing a condition of easy money, surplus reserves for member banks, and excess bank credit ready for utilization, (b) seeking through the International Economic Conference, or otherwise, a working understanding with the Bank of England for cooperative action toward restabilizing the pound and toward use of the credit factor as an influence for firming world commodity prices, (c) exploring possibilities of lifting prices of farm commodities in the United States through plans for restricting new production and working off surpluses.

Three-Fold Program Should Be Tried Out

This three-fold program should be tried out, under the presumption that its application will enable our economic order to emerge from stagnation and to enter upon a healthy recovery. Unless and until we have done these things and until, contrary to what we have every right to expect, we have proof that, even having made these adjustments, the economic machine cannot recover, we should refuse to consider currency inflation. Until the old-fashioned remedies for economic sickness have at least been honestly tried, it would be unwise to resort to desperate remedies.

SHORT-TERM DEBT

(Millions of Dollars)

	1913	1921	1929	1932 (Beginning of Year)
All bank loans	14,640	28,970	41,512	31,616
Brokers' loans "others"	....	....	2,800	6
Brokers' loans by foreign agents, etc	....	....	1,320	138
Intermediate credit banks	....	....	44	79
Life insurance policy loans	613	977	1,671	2,943
Instalment debt	89	620	6,000	3,000
Other personal debt	1,000	2,000	3,000	2,200
Open book account	1,700	3,750	4,500	3,400
Reconstruction Finance Corpn.	....	....	....	184
Total short term debt	18,042	36,317	60,847	43,566
Total debt, long and short term	55,311	120,068	182,440	175,410

A Base Metal that Matches the Plate When Exposed by Wear

WHEN exposed by wear, 18% Nickel Silver sheet reveals the ideal "white" matching color. This is true of the rod stock also. But—manufacturing an 18% Nickel Silver rod *with full lead content* for free turning is so much more difficult than rolling an 18% non-leaded sheet that the accomplishment is far from commonplace!

For over fifty years The Seymour Mfg. Co. has supplied this type of Nickel Silver rod.

The piston stems in the trumpet valves above are good examples of its use in maintaining a matching color. In course of time the constant rubbing of hands and gloves and hundreds of polishings wear through the plating of these stems—yet they still match the instrument.

Seymour 18% Nickel Silver rod is used not only in trumpet piston stems, tube braces, mouthpieces, etc., but also in the cross-rods of the better fishing reels . . . in the uprights, knobs and nuts of appliances . . . in auto trim . . . in the levers and exposed screw-heads of typewriters . . . and in numerous other plated parts where wear must not show.

Being a strong, ductile alloy, this rod can be drawn, hammered and formed; and it anneals uniformly. Because of its full lead content, it turns and threads cleanly with good production speed and with a minimum of wear on tools.

If you are looking for a free turning Nickel Silver rod of silvery white color, we shall be glad to send samples for test and contribute any helpful suggestions we can.

FOR SERVICE

THE SEYMOUR MANUFACTURING CO., SEYMOUR, CONN.

SEYMOUR

SHEETS, WIRE, RODS

NICKEL SILVER

ALSO: PHOSPHOR BRONZE SHEETS, WIRE, RODS : AND NICKEL ANODES

Chief Features of Last Year's Progress in Some Metallurgical Fields

Concluded from Page 32

comparison with the tonnage of ordinary steels, says the American Stainless Steel Co., Pittsburgh (THE IRON AGE, Sept. 22, page 441). A promising new field for the use of these steels is the beer brewing industry (THE IRON AGE, Dec. 15, 1932, page 935, editorial).

Alloy Wrought and Malleable Iron

During 1932 announcement was made of a process for alloying wrought iron with nickel, copper, molybdenum or combinations of these. It is claimed that the adding of alloys in no way changes the fibrous structure; it does, however, result in a 25 per cent increase in the strength in the as-rolled condition. The compositions preferred by one producer include nickel alone or nickel and molybdenum. There is a marked increase in fatigue-resisting properties, with an increase in strength in the heat-treated condition of 40 to 50 per cent over ordinary wrought iron.

In this connection there was announced last year the perfection of a metallurgical process for alloying malleable iron. Details of this were published in THE IRON AGE, March 24, under the title "Forged and Alloy Malleable Iron for Special Uses," by Fred B. Riggan, metallurgist, Birmingham, Ala. The author predicts a wide field for such castings because of higher physical and other properties. Copper and molybdenum are mentioned as alloying elements.

Selenium and Beryllium

Development last year of a ferro-alloy containing selenium made feasible the production by a prominent steel company of a new alloy steel containing this comparatively rare element (THE IRON AGE, Sept. 15, 1932). The product was a free-cutting rustless steel, considered by metallurgists as an important development.

Beryllium continued to occupy a prominent place in metallurgical advancement. Considerable research was continued in Germany and in this country. Some of the remarkable results of the perfection of a metallurgical method of producing and alloying this rare metal were described in THE IRON AGE, June 23. The results with copper and with bronzes are especially arresting. Exhibits of some of the products were made at the National Exposition of Power in New York in December by the American Brass Co.

Magnesium and Aluminum

Metallurgical progress in the production and heat treatment of magnesium alloys was a leading development in 1932. The cost of the metal and of fabricated parts was decidedly reduced, leading to greater application as castings, structural shapes, and sheets. There were developed improvements in rolling technique which have resulted in better physical properties and forming characteristics.

The largest user of these alloys thus far is the transportation industry. Applications in the aircraft industry have been increasing and the use of sheet for structural sections is finding wider applications in bus, truck and trailer construction. The application of these alloys in foundry flasks, patterns and core boxes has expanded as well as their use by several large manufacturers of portable tools and equipment. Their extreme lightness and strength are important properties.

There was also continued research in the perfection of heat-treating methods in the aluminum alloy industry resulting in forward progress in that important non-ferrous industry.

What the Future Offers

THE foregoing summary represents a record of considerable achievement for last year in the fields touched on. It has not been possible to include every development. Much progress has been made in certain branches of non-ferrous metallurgy, in the X-ray and gamma ray inspection of metals, and in other researches. When the complete story, which will include investigations conducted last year but not made public, is written, the advances will fully measure up to those of other years. As it is, the record is full of promise and of importance.

Based on achievements thus far, we may confidently look forward to further progress. Undoubtedly the large-scale production of uniform and high quality open-hearth steel by all companies is "around the corner," and the continued development of electric furnace and duplex melting, together with a more economical use of alloys in steel and iron, and the profitable and safe use of scrap on a large scale in the blast furnace, the open-hearth, and the cupola, are assured.

The rapid changes which developed last year and the two previous years in heat treating, particularly the regulation of atmosphere, of combustion, and of cooling in furnaces, promise to develop further and to insure a better product at less cost. Nitriding has established itself as a regular commercial process, with cast iron and possibly other materials offering new fields in which to apply it. Researches in the fatigue of metals promises more knowledge regarding causes of failures, thus assuring more dependable products. Non-destructive examination of metals as exemplified by X-ray, gamma ray and magnetic testing, will reveal defects more quickly and accurately than ever before.

A large field for improvement lies open in the rustless steels. Methods of production are certain to be refined and new combinations of alloys, with new applications, are promised, based on progress thus far. This is especially true of alloy gray iron and other allied products, wrought and malleable, where the possibilities have been only partially surveyed. And as a result of the forward studies in the metallurgy of the rarer elements—selenium, beryllium, titanium, magnesium and so on—the possibilities loom large. With a return of normal conditions, the possible advancements are manifold and arresting.

Use of Resistance Welding Machines Expands

THE field of resistance welding applications has continued to expand, equipment now being available for use in fabricating steel flooring, burial vaults and all-steel caskets, steel mats for concrete reinforcement and many other products.

In equipment for resistance welding machines, a new timing control employing an electronic tube features close accuracy and small mounting space.

A Thyratron control device, brought out by another company, for closing and opening an electrical circuit which determines the time power is applied to a resistance welding machine, is said to operate satisfactorily up to 1800 interruptions per min. on a 60-cycle power supply. Standard apparatus is now available for controlling welders up to 350 kva., but a device suitable for loads up to 700 kva. can be made. Welding of stainless steel without discoloration is being done, and the control is believed to be important in solving the problem of welding Dow metal.

Highly developed production machines for removing flash from drums and other welded products were brought out last year.

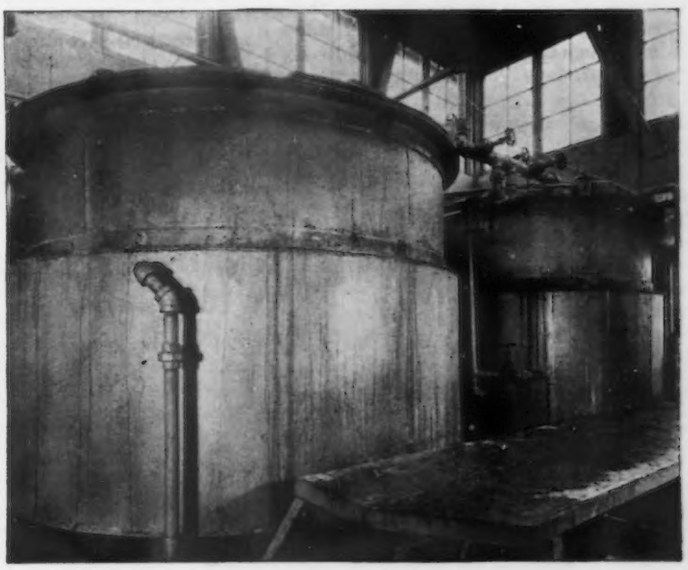
New Method of Thermit Welding Rail Joints

A new method of thermit welding rail joints known as the "cross and center pour method" has been developed to provide greater speed and to assure better welds at lower cost. The welding can be done without interfering with car traffic. Perfect fusion of the head and base portions of the rail joint is claimed. Although the new process eliminates the heavy collar of deposited metal on the web of the rail, excellent fusion is obtained in the web, giving the weld in this portion a strength equal to if not greater than that of thermit welds having large collars.

Fabricators *find this new* STAINLESS-CLAD STEEL *a Big Help in Closing Contracts*

Take those industries which today lead in activity, and you will note they parallel those that are interested in stainless steel service. Breweries, Food and Packing Plants, Textile Plants, Tanning Plants, Paper Mills, Soap Plants, Drug and Chemical Plants, etc., demand the non-corrosive qualities which only stainless metals afford.

But today the dollar invested looks bigger. It must go farther. That's why fabricators who have been specifying Ingersoll Stainless-Clad Steel find it the greatest aid in closing contracts.



The above tanks were produced from Ingersoll Stainless-Clad Steel for a manufacturer at a very large saving over other acid-resisting tanks formerly used in this industry.

Combines Stainless Steel for *Service* with Low Carbon Steel for *Economy*

Ingersoll Stainless-Clad Steel provides this ideal combination. The outer surface is of the finest quality 18-8 stainless steel—giving the same acid and corrosive-resisting service that the solid stainless metal would give. The back is of low carbon steel, permitting savings in material cost of approximately 50%.

"Welded in the Ingot" by the Ingersoll Patented Process

A stainless steel outer ply of 10% or 20% for plates, and 20% for sheets, is permanently bonded together on a base of low carbon steel. The two plies of metal form a union which is not affected by manufacturing processes nor by subsequent use. It may be formed, drawn, spun, beaded, braised, welded, soldered and fabricated by the same equipment used for handling deep drawing steels.

Showing standard A. S. M. E. butt weld of Ingersoll Stainless - Clad Steel.

Be sure to investigate Ingersoll Stainless-Clad Steel at once. Get your share of the available business by putting in a bid that's right on material that will properly meet the service requirements. Our engineers are at your service.

INGERSOLL STEEL & DISC COMPANY

(A Division of Borg-Warner Corporation)

Specialists in high carbon, alloy and high speed steel sheets

310 SOUTH MICHIGAN AVENUE, CHICAGO, ILLINOIS

Plants: Chicago, Illinois, and New Castle, Indiana

INGERSOLL (Trade Mark Reg.)

STAINLESS-*Clad*-STEELS

MADE BY THE INGERSOLL INGOT PATENTED PROCESS

Sharp Shrinking in Building Construction

(*Concluded from Page* 11)

ed. Additional loans are expected in growing volume.

Up to Dec. 24 the Reconstruction Finance Corporation had granted 51 loans aggregating $146,535,000, but of this amount only $360,000 had actually been advanced, which shows how little work has been done on these projects.

Delays in getting self-liquidating projects started have not been wholly because of the work involved in the offices of the R.F.C., but have been due in many instances to the time required for completing plans and in getting through necessary State laws and city ordinances, while in a few instances taxpayers' suits have held up final action. When money for the self-liquidating projects can be obtained by public bond issues, that method is used, but the Finance Corporation stands ready to take the bonds if it has already given approval to the loan.

Loans for self-liquidating projects range from $10,000 for waterworks extensions in small towns to $62,000,000, the amount granted for the San Francisco-Oakland toll bridge, on which work soon will be started.

The R. F. C. will not give out information regarding applications for loans when no action has been taken. It is known, however, that many are awaiting decision. It is estimated that such pending applications total well over a billion dollars, and the structural steel requirements for these jobs would exceed 1,200,000 tons.

The principal projects for which loans have been granted are as follows:

Metropolitan Water District, Southern California, aqueduct—25,000 tons structural steel; 60,000 tons drill steel; 2000 tons steel rails; 400 tons steel tunnel supports; 5,000,000 lb. copper cable; machinery and equipment; 1000 tons pipe for compressed air and water lines.

Belt Line Bridge, New Orleans—58,000 tons structural steel and 5000 tons reinforcing steel.

Middle Rio Grande Conservancy District, Albuquerque, N. M., flood control, irrigation—Tonnage not given.

Ogden, Utah, waterworks—8200 tons cast iron pipe.

San Francisco-Oakland toll bridge—170,000 tons structural steel and wire; 20,000 tons reinforcing bars and large quantities of pipe.

Roanoke, Va., waterworks and sewage system—2500 tons cast iron pipe.

Hillside Housing Corpn., New York City (Bronx), complete neighborhood housing unit for 1581 families—Tonnage not given.

Hobart, Okla., waterworks dam—1800 tons cast-iron pipe.

New York State Bridge Authority, toll bridge across Hudson River—12,000 tons structural steel.

West Monroe, La., waterworks additions—450 tons cast iron pipe.

Danville Township, N. J., waterworks enlargement—930 tons cast-iron pipe.

Tampa-Clearwater Bridge Co., toll bridge, causeway—200 tons structural steel and reinforcing bars.

Richmond (Va.) Bridge Corpn., toll bridge over James River—3200 tons reinforcing bars.

Columbia, Ill., water pipe line, booster pumping station—700 tons cast iron pipe.

El Capitan dam, San Diego, Cal.—15,000 tons of cast iron or steel pipe.

Extension waterworks system, Savannah Beach, Cal.—300 tons cast iron pipe.

St. Paul, Minn., Friedman Bros. Holding Co., $450,000—Public market, including garage. Requires structural steel, reinforcing bars, sheet metal, steel sash, door.

City of Chicago, $2,327,000 for new pumping station with mains—5000 tons cast iron pipe; materials for building and six 50,000,000-gal. pumps.

Farm Implement Trade Has Shrunk Steadily

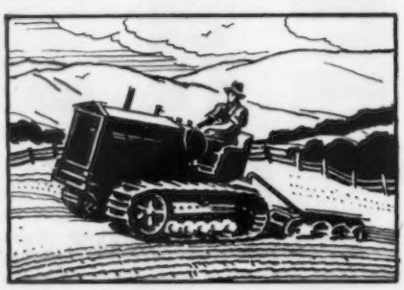
ONE of the important markets for steel that has been seriously dwindling is the farm equipment industry. Output of farm machinery has been shrinking for two and a half years, closely following the downward price trend of farm products, until today it is the lowest since the beginning of the depression.

Although this situation is beyond the control of the farm machinery manufacturing companies, they have been striving in various ways to rebuild their markets in so far as the impoverishment of agricultural buyers warrants. They are offering a wider range of sizes of equipment; designs now call for greater use of alloy steels, heat-treated forgings, roller and ball bearings and similar refinements.

These and other programs are moving forward so steadily that there is no hint from the manufacturers that they entertain any other thought than that their markets will return when the farmer can again realize a profit from his labor, when world conditions are adjusted to a more uniform level of exchange, and when nationalism again gives way to normal trade between nations.

American farm machinery manufacturers are still disinclined to meet terms demanded by the Soviet Government, and for the time being that market is closed. Its return is not expected in the immediate future. There are recurrent signs of a breakdown in the Russian program to operate in a major way in the world's wheat market. Reports now coming from that country indicate rather a serious shortage of farm products needed this winter for home consumption. Italy continues to press vigorously its nationalistic program, while other markets for machinery, such as South America, are temporarily closed because of unfavorable exchange rates. Hostile tariffs, an expression of the craze to promote nationalism, form another barrier against the world farm machinery market.

Improvement in the domestic market may come through several sources. The drive to reduce taxes is destined to give aid. The farmer has already reduced costs of production by such methods as are available to him. He is looking for relief in the form of lower transportation costs for the reason that the bulk of our farm products that move in world trade are grown in the Central States, with an average freight rate to seaboard of 25c. a bushel. This places the American farmer at a decided disadvantage when competing with grain that is grown not only with cheaper labor and on cheaper land but also at or near seaboard.



Experiments are under way in Iowa to mix alcohol, made from farm products, with gasoline for use in internal combustion engines. Also, there is every reason to believe that an appreciable acreage formerly planted in wheat will now be sown in barley for use at breweries, thereby tending to reduce the production of surplus wheat.

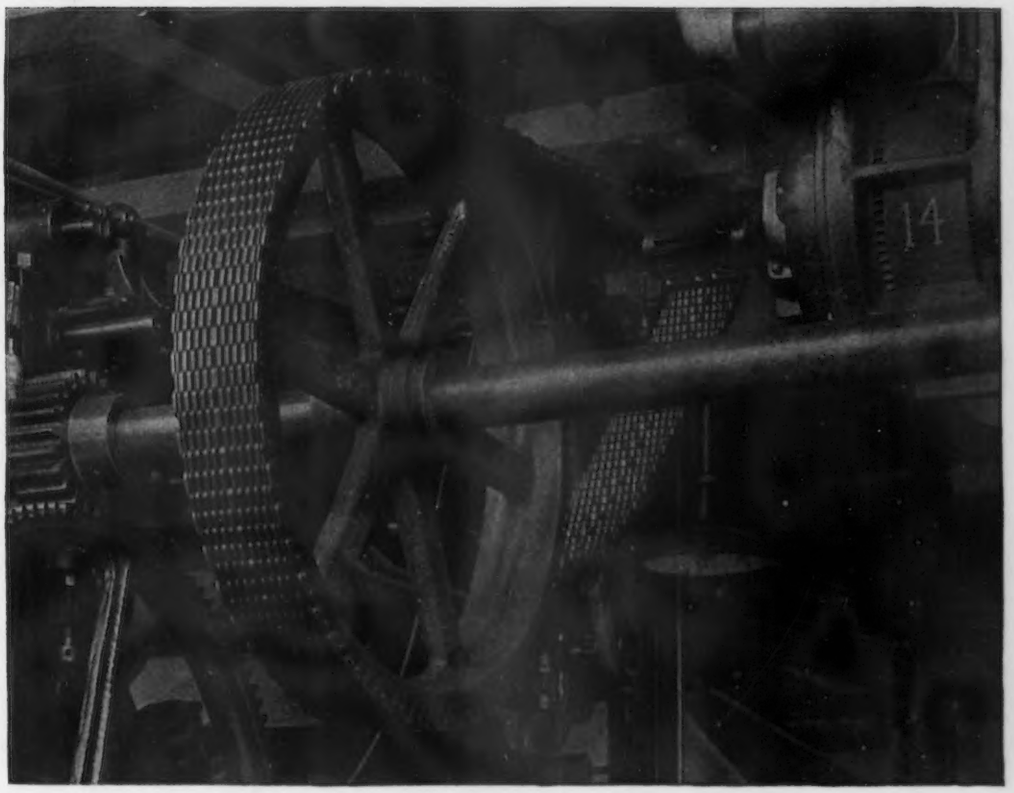
Although farm machinery manufacturers emphatically deny that the horse will again play a major part on the farm of the size that should be mechanized, the farm horse population is growing, and where this is true some grain acreage of necessity will be turned back to hay for feed. It has been computed that even at present low prices for feed, the cost of purchasing and operating a tractor is 28 per cent lower than buying and keeping horses that would do an equivalent amount of work. The chore time for eight horses, it is said, is 528 hr. a year, whereas the chore time for an all-purpose tractor is only 63 hr.

The question is often raised concerning the cost of farm equipment and its relation to the income of the farmer. Averages show that out of each dollar of income to the farmer 3c. is paid out for machinery to prepare the soil, plant and harvest. Interest on his farm debts and notes outstanding take 8c. whereas 11c. out of his dollar goes for taxes. From time to time, as design and economies have permitted, the selling prices of machinery have been reduced. As an illustration, a two-plow tractor cost the farmer $1,450 in 1914, while today for the same sum of money he can buy a better and more powerful tractor and in addition a two-bottom tractor plow, an 8-ft double-action disk harrow, a 24-ft. drag harrow, a manure spreader and a tractor-pull mower; and he will still have sufficient cash remaining to buy 1265 gal. of distillate at 8c. a gal., which is sufficient for a year on the average farm. The farm implement manufacturer has always been a close student of costs. He has extended liberal services after sales and he has had to contend with being in the banking business because he has always held much farm paper.

Improvements introduced by farm

PRODUCTION

STARTS WITH THE POWER DRIVE



The Lasting Efficiency of WHITNEY Chain Drives eliminates costly power transmission losses.

Production on today's basis can be profitable only when the full efficiency of mechanical equipment is utilized. An added responsibility is placed on the power drive to maintain constant machine speeds and to eliminate costly power transmission losses.

Positive WHITNEY Silent Chain Drives have proved their ability to give dependable and lasting power transmission efficiency with a minimum of attention and maintenance expense. They have the added capacity to handle overload conditions, which makes them especially desirable.

Specify WHITNEY Silent Chain Drives for positive power transmission.

THE WHITNEY MFG. CO. HARTFORD, CONN.

Sales and Engineering Offices

CHICAGO	549 W. Wash. Blvd.
BOSTON	10 Mt. Auburn St.
DETROIT	2-240 Gen. Motors Bldg.
CLEVELAND	1213 W. Third St.
PHILADELPHIA	133 S. 36th St.
NEW YORK	250 W. 54th St.
SAN FRANCISCO	1142 Howard St.
SYRACUSE	201 Norwood Ave.

Agents in Principal Cities

WHITNEY SILENT AND ROLLER CHAIN DRIVES

FOR POSITIVE POWER TRANSMISSION

implement manufacturers include tractors fitted with rubber tires, which reduce traction losses and thereby lower fuel consumption. Small tractors are being offered to widen the scope of use, reduce first cost and lower the outlay where a light second tractor is needed. Tractor speeds are being raised so that plowing speeds up to 5 miles an hour are available. A new ½-ton truck is the offering of one builder, and track-laying tractors are opening the industrial and contracting fields. A new and improved beet topper is on the market. And, in addition to all of this, most equipment of standard design is being improved in order to give better service and longer service to the buyers whom the farm machinery builders feel assured will return to the market not alone for machinery new to buyers but for an appreciable quantity of replacements.

Steel Trade Has Shown Some Gains in Britain and on the Continent

(*By* THE IRON AGE *Correspondent*)

LONDON, ENGLAND.—The chief feature of the British iron and steel industry during 1932 was, of course, the introduction of tariffs which was heralded by its sponsors as being the grand panacea for all the ills of industry and commerce. While the promised cure is far from having been effected in Britain, the mere anticipation that a tariff was likely produced wholesale buying of stocks. The world depression as yet is barely one whit relieved, these stocks can only be used up slowly, hence so far the raw steel makers have not yet reaped much benefit.

Meantime, in order to retain as far as possible the important British outlet for their products, particularly of semi-finished steel, Continental producers cut their prices almost to ribbons. It was only to be expected, therefore, that once the overseas demand awakened, Continental prices would recover, and, with the sterling depreciation and the war debts controversy, business in Continental semi-finished steel with British users was virtually brought to a standstill.

With supplies of foreign material thus cut off, the British works began to wake up, and blast furnaces and steel plants long idle are now being restarted. Nevertheless, it will need a considerable growth of demand to absorb the promised increased output. There are, however, comparatively good prospects in the Welsh tin plate trade which is indeed as a bright spot in a very gray landscape.

British Steel Output Gaining

The steel output of the United Kingdom is now increasing from the lowest point and, although most of the country's capacity is idle, plans are, nevertheless, in execution for increasing steel-making facilities. For instance, Stewarts & Lloyds, who produce 80 per cent of the British tubes, propose to build a basic Bessemer steel plant and an associated tube plant in Northamptonshire, utilizing local ore. This undertaking will cost about £3,000,000, which will be found by the Bankers' Industrial Development Co. a concern formed by the Bank of England some time ago to facilitate the provision of finance for economic developments in the basic industries. Whether the new concern will ever function remains to be seen, because the tariff on foreign steel is only definite so far for two years, and a change of government could alter the fiscal policy at a moment's notice. Anyway there is idle steel capacity already in the country representing millions of tons of steel a year, and to spend millions of pounds sterling merely to erect another plant, even though it be basic Bessemer, looks like a hazardous venture.

Continent Has Had Improvement

On the Continent the last month or two has seen a perceptible improvement in the rate of iron and steel operations. Thus the raw steel output in Belgium rose from 170,000 metric tons in July, the year's low point, to 222,000 tons in September; in Germany a recovery took place from 392,000 tons in September to 522,000 tons in October, while in Luxemburg 172,000 tons was produced in October against 160,000 tons in July. On the other hand, the French output in September was only 456,000 metric tons against 468,000 tons in June and 473,000 tons in August, while in Poland the steel industry reports a continued shrinkage of new orders.

It will be interesting to watch whether the revival in Belgium, Germany, and Luxemburg heralds the beginning of a definite trade expansion there. The disappointing trend of the industry in France is due to a large extent to the comparatively high costs of production in that country, attributable to the fact that France, attacked later than others by the crisis, is yet only in the early stages of economic adjustment. Poland's plight is largely due to the drying up of Soviet contracts resulting from the increased difficulty experienced in discounting Russian bills.

Early last year there were spurts in German and Belgian raw steel output, which, however, were not maintained. The Belgian improvement was apparently based on a fallacious view that the economic position had already began to mend, while the German output figures were swelled by the receipt of Russian contracts for hundreds of thousands of tons of rolled steel for urgent delivery.

The latest recovery, however, seems to have been based on broader factors. European mills have encountered a marked improvement in export buying, the Far East, Middle East, and South America having developed considerable interest. In Germany the situation has been additionally strengthened by the bold credit and employment creation scheme promoted by the Government there. Looking back, one is almost tempted to declare that the trough of the great depression, so far as the Continental iron and steel industries are concerned, was reached about the middle of the present year, but in view of the extraordinarily obscure outlook as regards war debts, the methods of international trading and finance generally, and the Ottawa agreements, prophecy is more dangerous than usual.

Canadian Industry Hard Hit

THE Canadian iron and steel industry has experienced the dullest year in its history, conditions there having been a counterpart of those existing in the United States. Steel plant operations averaged about 15 per cent for the year. Steel ingot output was about 298,308 tons (with December estimated) against a peak of 1,309,543 tons in 1929, while pig iron output last year was only 116,950 tons compared with 1,080,160 tons in 1929.

While there were indications of improvement at various times during the year, none of these movements made much headway. Several efforts were made to bring about a change in economic and industrial conditions, but without much success. The Imperial Economic Conference gave some hope for better times, a result of that meeting having been the revision of tariffs by the British and Canadian governments with the object of creating a larger volume of business within the Empire, but these changes have thus far shown very little favorable result.

The business depression was felt in all branches of industry from the primary to the finished products. Steel mills received very little support in new business from the Government and the railways.

The automotive industry gave some assistance in contracts for special steel and automobile parts, but these ran out before the middle of the year. Building trades experienced one of the worst years in history. Very little building was done, and steel fabricators had to depend on a few bridge projects to keep their plants running at even a small percentage of capacity.